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## **Abstract**

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With China's accession to the WTO expected in early 2002, the Chinese grain sector faces pressure from both external competition and internal shifts in consumer preferences that could reshape the industry. Following China's WTO accession, imports of wheat, soybeans, vegetable oils, and cotton are likely to rise. China's rice exports may rise while its corn exports will likely fall. China's huge appetite for soybeans to feed its emerging livestock and edible oils industries continues to grow. China's livestock sector is internationally competitive in terms of production costs, but sanitary issues limit export opportunities. Surging textile and apparel exports boosted demand for cotton and encouraged farmers to increase cotton acreage in recent years. In the long run, continued rapid growth and openness to trade in China will simulate demand for food and fiber, but stagnant rural incomes and growing regional inequality temper optimism.

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# CHINA

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## Summary

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USDA estimates that China's production of wheat, corn, and rice fell by a combined 44 million tons in 2000/01, a decrease of 11.5 percent from 1999/00. Area sown to grain fell again in 2001 as many farmers devoted more land to cotton and other cash crops. Wheat and corn imports continued at minimal levels in 2000 despite double-digit decreases in production for both of these crops. In late October 2001, China still had no intent to import grain although there were signs of tighter grain supplies. Corn exports, helped by subsidies that will be discontinued after China's accession to the World Trade Organization (WTO), continued at a steady pace in 2001, with 3.6 million tons exported in the first 7 months. This amount followed near-record corn exports of almost 10 million tons during 1999/00, a year when domestic production dropped due to low prices and drought.

Meanwhile, China's demand for soybeans to feed its emerging livestock and edible oils industries continued to grow. Soybean imports are expected to top a record 13.2 million tons in 2000/01. China's procurement prices heavily favor production of corn rather than soybeans, a factor contributing to large soybean imports. Soybean imports were roughly equal to corn exports in recent years. The 13-percent value-added tax on soymeal imports favors imports of soybeans over soymeal.

China's agricultural sector is still feeling the effects of record grain harvests in 1998 and 1999 that filled storage facilities beyond capacity and put downward pressure on prices. Grain reserves remain large despite relatively low grain production in 2000 and low levels of imports, except for soybeans. In May 2001, USDA revised its estimate of China's grain stocks, an adjustment that increased estimates of world grain stocks by 164 million tons. An article in this report examines China's grain reserve policies and explains how USDA produced the new estimates. China's Ministry of Agriculture calls the revised estimates "close to reality."

The grain produced in China is often poor in quality. Bakers and millers are increasingly demanding high-quality wheat for breads and baked goods. The government is starting to move away from past policies that sought to increase quantity of grain produced without regard to quality. Protection, or support, prices for certain types of low-quality wheat and rice have been discontinued. Premium prices are offered for high-quality grains. New grading standards have been introduced for wheat and rice, but many farmers and merchants are still unsure of what constitutes "quality" grain.

The country's large grain stocks are being drawn down. Imports of wheat may bounce back and subsidized exports of corn and cotton will end following China's accession to the WTO. Dry weather in important growing regions of northern China during spring 2001 may have tightened grain supplies further, with an estimated decrease of 5 million tons each for wheat and corn in 2001/02.

Surging textile and apparel exports during 2000 boosted demand for cotton and encouraged farmers to increase cotton acreage in 2001. The newly established China National Cotton Exchange has sold 2.5 million tons of state-reserve cotton to domestic mills since December 1999 to curtail rising prices. China was again a net exporter of cotton in 2000, as imports registered low levels for the second consecutive year. Subsidized exports of cotton from Xinjiang province have continued in 2001, at a lower subsidy level, and imports should rise as domestic

supplies tighten. Farmers have readily adopted genetically modified pest-resistant cotton, the only major genetically modified crop currently grown in China.

The livestock sector is expected to play a key role in reshaping China's agriculture in the coming years. The expanding scale of the sector and the shift from backyard to modern feeding operations will expand the demand for feed ingredients, including grains and protein meals. Measures of comparative advantage indicate that China's livestock sectors are internationally competitive, while the grain sector's competitiveness has eroded. But sanitary issues will continue to be a barrier to exports in the near future.

China's economy is still one of the fastest growing economies in the world, with a reported 8-percent gross domestic product growth in 2000. A surge of foreign investment and continued government spending stimulated the country's economy during the first half of 2001. In the long term, greater openness to trade and social reforms will boost economic growth, stimulating demand for food and fiber. However, this optimism is tempered by stagnant agricultural incomes in recent years and the growing gap between China's booming coastal regions and poor interior provinces.

China's rural economy must redeploy its agricultural inputs as the sector modernizes and reshapes itself to face global competition. While much progress has been made, rural institutions and policies continue to impede the free flow of land, labor, and capital. Household registration and land tenure systems tend to exacerbate the surplus of labor in agriculture. Lack of land ownership and poor access to credit discourage soil conservation and other investments that have long-term productivity payoffs.

China's long-awaited WTO accession is expected in late 2001 or early 2002. This report includes a summary of the agricultural provisions of the 1999 U.S.-China bilateral agreement that serves as the foundation of China's terms of accession to WTO. Tariff-rate quotas will be established for major bulk commodities, and private trading enterprises will be allowed to participate in trade activities.

Major impacts on agricultural production, policy, and trade in China are expected after the country's accession to the WTO. Imports of wheat, cotton, soybeans, edible oils, and soymeal are likely to rise, as will China's rice exports. China's consumers would enjoy lower food grain prices. Corn exports from northeastern China will continue, but imports will increase in corn-deficit southern provinces.



# China's Continued Growth Leaves Agriculture Facing Changes

Bryan Lohmar

**Highlights:** China's official GDP growth rate rose from 7.1 percent in 1999 to 8 percent in 2000, indicating recovery from some major external shocks, including the Asian financial crisis (1997-98). GDP is expected to continue rising at a relatively rapid rate as China maintains high levels of public investment and implements important reforms in accordance with its WTO accession agreements. Agricultural income growth, however, has not enjoyed the high rates seen in other parts of the economy, with 2000 agricultural GDP increasing only 2.9 percent over 1999. Continued progress in the nonagricultural sector will cause agriculture to undergo significant changes through competition for inputs and increasing demand for variety in food consumption.

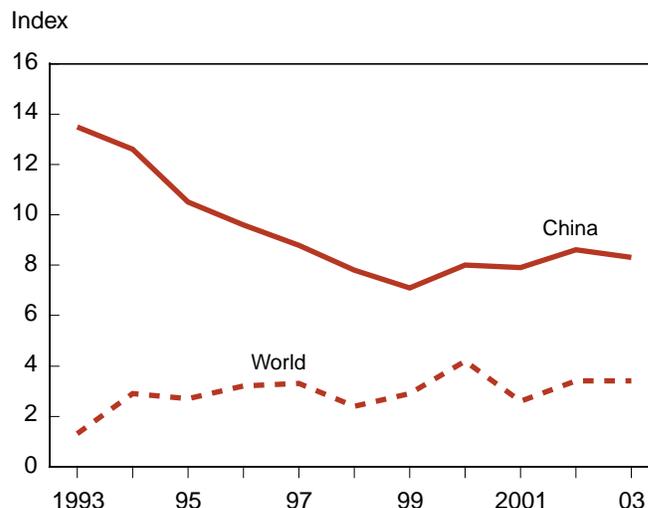
## Growth Rate Rose in 2000

China reported a year-on-year rise in its gross domestic product (GDP) growth rate in 2000, the first year-on-year increase since 1993 (fig. A-1). China's official estimates show that GDP grew by 8 percent in 2000 (year on year), higher than the 1999 growth of 7.4 percent and above the government's year-2000 target of 7 percent. Although the accuracy of China's national income statistics is questionable (see box), most observers agree that economic growth has accelerated following recovery from the effects of the Asian financial crisis. The deflationary period brought on by the crisis is also over (China's Consumer Price Index rose 1.2 percent in 2000).

All signs have pointed to continued growth in 2001, although growth is expected to slow due to the global economic slowdown. The official GDP growth target for 2001 is 7 percent, but China reported an estimated 8.2 percent GDP growth rate for the first half of 2001, above even the 7.4 percent reported for the fourth quarter of 2000. While a global economic slowdown will put downward pressure on China's economic prospects, the slowdown is not expected to last long and information technology, the leading component of the current global slowdown, is not a large part of China's export sector. In addition, the effects of the slowdown on China's economic performance will be

offset by domestic spending and increased foreign direct investment (FDI). If China's economic expansion does slow to the government target, China would still fare better in 2001 than most other Asian countries, as well as the European Union and the United States.

Figure A-1  
China and world GDP growth



Source: USDA baseline. GDP figures for 2001, 2002, and 2003 are estimates.

## Is China Really Growing That Fast?

Recently, a number of statisticians and economists, both inside and outside of China, have expressed skepticism over the accuracy of the country's official growth statistics. Much of this skepticism dates back to 1998, the year that high-level Chinese government officials "guaranteed" the country would achieve 8-percent growth despite the downturn generated by the Asian financial crisis. The statements by high-level officials are believed to have caused the elaborate statistical reporting system to find ways to meet that percentage, or a percentage close enough for the government to "save face." Observers point out that while some official statistics show GDP growth rates to be 7-8 percent in the late 1990s, other official statistics contradict them. For example, electricity and energy consumption, usually closely related to economic growth, grew at much lower rates or declined.

Western experts on China's economy and members of the statistical and policy-making community in China agree that overreporting production by grassroots administrative units exaggerates statistics measuring China's economic growth. Several scholars have published critiques and proposed solutions to the current "wind of falsification and embellishment" overtaking many lower level statistical reporting agencies.<sup>1</sup> Indeed, even high-level government offi-

<sup>1</sup> Rawski, Tom, *China's GDP Statistics: A Case of Caveat Lector?*, working paper, University of Pittsburgh, Department of Economics, 2001.

cials have been critical of the rampant falsifications and no longer make strong public pronouncements on growth targets. Most skeptics are careful not to put the blame for the reporting inaccuracies on the National Bureau of Statistics (NBS, formerly the State Statistical Bureau), which publicly rejected the GDP numbers reported by the provinces in 1998, 1999, and 2000 and reported numbers corrected for overreporting by provincial bureaus instead. However, it is unclear how official numbers reported by the NBS were corrected and many consider it impossible to extract the correct number from figures that may have been altered capriciously at several levels of the reporting system.

The size and extent of reporting bias in China's official statistics has generated widespread debate. Some observers claim that official statistics overstated growth by about 2 percentage points throughout the 1990s. Other observers, such as Tom Rawski, professor of economics at the University of Pittsburgh, suggest that recent inaccuracies could be much greater, with actual growth in 1998 and 1999 likely hovering around zero. Fortunately, most observers agree that the overall economic trend is correct: GDP growth in China slowed in 1998 and again in 1999 but rebounded in 2000.

Exports increased substantially in 2000 and may still be benefiting from policies introduced in response to the Asian financial crisis. China's government withstood pressure to devalue the renminbi during the crisis, when the currencies of many trading partners and competitors experienced huge devaluations. To accommodate exporters and maintain a strong currency, China implemented a number of policies to benefit exports. Direct budget outlays for export subsidies were officially abolished in 1991, but the government was able to promote exports through tax rebates, low interest loans, and other indirect subsidy programs. In 2000, trade surged as exports increased 27.8 percent and imports increased 35.8 percent over 1999. Rapid expansion of trade has continued in 2001. The recovery of other Asian economies and moderate growth in the United States helped to stimu-

late exports. However, China's trade surplus figures may have been reduced by a crackdown on import smuggling in 1999-2000.

Domestic demand rose substantially in 2000 and contributed to China's economic recovery. The government maintained its proactive fiscal policy and increased government spending by 10 percent from 1999 levels. Increased government spending is intended to improve China's infrastructure as well as boost domestic demand. In addition, consumer spending grew by 9.7 percent over 1999, the first increase in consumer spending growth rates since late 1997. In recent years, the government has implemented a series of policies designed to increase consumer spending, such as lowering interest rates paid on savings, expanding consumer credit, and

extending official holidays. Due largely to these measures, consumer spending rose faster than GDP in each of the last 3 years. FDI also increased significantly in 2000 and early estimates point to rapid growth in 2001, as foreign companies scrambled to establish, or expand, their holdings in China to take advantage of the growth expected from WTO accession.

Economic progress in China, substantial as it has been, is uneven and concentrated in urban and coastal regions. Economic progress in many parts of China was stagnant throughout the high-growth years of the 1990s, and these areas continue to show little sign of becoming part of the country's modernizing economy. Typically, inland areas, such as Anhui, Sichuan, and Shaanxi provinces, have lagged behind coastal areas, such as Guangdong, Fujian, Zhejiang, and Jiangsu provinces. Agriculture's development has been slower than that of other sectors, so areas relying heavily on agriculture have seen little economic growth. For example, growth in value added, the value of output minus the value of input, was only 2.4 percent for agriculture in 2000, compared with 9.9 percent for industry. The stagnant agricultural sector is partly responsible for the widening rural-urban income gap. Per capita net income growth of rural households slowed for the fourth year in a row, to only 2.1 percent in 2000, while urban incomes rose 6.4 percent. Urban per capita income was 6,280 yuan in 2000, compared with 2,253 yuan for rural per capita income.

### ***Reform Is Key to Sustained Growth***

China is expected to maintain its relatively strong growth rate for the next few years, despite the expected global economic slowdown in the near term. To offset slowing demand for China's exports, the government plans to implement a variety of policies to increase domestic demand. In the recently released budget for 2001, China's government committed to large public investment and an overall increase in government spending of 9.3 percent. China continues to establish new policies and programs to encourage domestic consumption, such as a recent 30-percent increase in civil servant salaries and introduction of a social security program for urban workers. In addition, China's expected accession to the WTO will attract increased FDI and spur domestic demand. China already has the world's third-largest stock of FDI, about \$350 billion, trailing only the United States and Great Britain.

Thus far, economic growth has come without expending much political capital on difficult policy reforms that will adversely affect well-established and powerful interest groups. Key areas in need of reform include the large and financially troubled state-owned sector, an ineffective tax collection system, and a banking system plagued with nonperforming loans. Not only do each of these areas resist reform efforts, but each area also is closely related to the other areas targeted for reform, making for a powerful unified front of resistance to changes necessary to bring about continued economic progress.

At present, there appears to be sufficient commitment to make difficult changes and forge ahead with the difficult task of reform. State-owned enterprise (SOE) reform has made significant progress in recent years, despite slow economic growth. The number of large and medium money-losing SOEs fell from 6,599 in 1997 to 2,501 in 2000. While this drop was achieved largely through merging unprofitable SOEs with profitable SOEs, total profits in the state-owned sector still rose 150 percent in 2000 to 242 billion yuan, up from 97 billion yuan in 1999. The rise in profits was due somewhat to high oil prices benefiting the huge state-owned oil companies; 63 percent of all SOE profits were made by the 10 largest SOEs, 3 of which are petroleum companies. Bank reform is also progressing, with the recent establishment of asset management corporations to absorb the nonperforming loans from the state-owned banks. In addition, China's leaders have begun to implement their WTO-accession commitments to reform trade practices and rules governing FDI.

### ***Growth Will Bring Changes in Agricultural Production***

Rapid growth in the nonagricultural economy will affect both the demand for and the supply of food in China. Rising incomes are clearly changing food consumption patterns. Demand for meat, fruits, vegetables, and other high-value commodities are rising rapidly. The per capita demand for staple food grains, such as wheat and rice, however, is not increasing as fast and may even be falling as consumers substitute higher value foods for staple food grains. Growing urban incomes will continue to put upward pressure on the demand for processed and higher quality foods, including high-quality food grains (see article "Surplus Wheat Production Brings Emphasis on Quality," in this report). As these changes in food consumption

patterns are transmitted back to farmers in the form of price changes, agricultural production patterns are shifting to cater to the rising demand for meat, fruits, vegetables, and other high-value crops.

Liberalizing trade practices and further opening up the border will add pressure to reshape China's agriculture. Producers can be expected to respond to international market conditions. Some changes are already being made. For example, large areas in Shandong province have been converted from grain to vegetable production to supply inexpensive vegetables and other nongrain agricultural goods for consumers in Japan. Rising imports of inexpensive agricultural products from China has had such an impact on producers in Japan that Japan recently imposed temporary import protection on some Chinese agricultural products (shitake mushrooms, scallions, and rushes to make tatami mats).

The effects of rapid economic growth on agricultural production may be more significant on the supply side of the market. As the nonagricultural economy continues to expand, agricultural production must increasingly compete with the faster growing nonagricultural sector for important inputs, such as land, labor, and water, particularly in the more industrialized coastal provinces. Farmers will want to choose crops, crop varieties, and production methods so that the returns from land, labor, water, and other inputs used in agriculture rise until they are comparable to nonfarm uses of these inputs. As rural incomes grow and nonfarm sources of income become more common to farm households, farmers will be able to purchase staple grains instead of growing them themselves. This transition will allow many farmers to grow higher value cash crops instead, giving other farmers an opportunity to specialize in grain production or rely more on the international market for grain supply.

### ***Agricultural Policies in Conflict***

As economies grow and industrialize, they generally shift from policies that tax agriculture to policies that provide subsidies for agriculture so that agricultural production can be maintained in the face of higher

value uses for important inputs. China's economic policies seem to be at a crossroads. While there are no nationally representative data on agricultural taxes at the local level, it is widely believed that local officials have increased agricultural fees and taxes recently to ease the mounting debt load carried by local governments. The national government, however, contends that it should have the right to protect agriculture (through subsidies) at a high rate as part of its WTO-accession agreement. Thus, it appears that China's national government envisions a day when it will subsidize its farmers as is done in developed countries. As local governments still rely heavily on agriculture as a tax base, continuing to do so would directly conflict with the national government's policy of subsidizing agriculture. In addition, differential taxation of agricultural producers at a time when those producers are learning to adjust to international competition and competition for important inputs will serve to impede the development of an efficient and competitive agricultural sector.

The national government in China also seeks to hasten agricultural development by allocating a large share of China's future public investments to projects that will benefit agriculture. As part of China's aggressive investment program, the government will put more money not only into roads but also into the water recovery, storage, and delivery infrastructure to expand irrigated acreage. China will also invest in research and extension of water-saving irrigation technology. China has earmarked money for research into high-yielding, high-quality, and technologically advanced seed varieties. In addition to making investments in public goods to increase agricultural production, China's central bank has announced that it will boost re-lending to rural credit agencies by 20 billion yuan (\$2.4 billion) in the first half of 2001 to provide China's farmers more access to credit. This policy will make it easier for farmers to buy high-quality seeds, water-saving irrigation technology, and other modern inputs to increase the efficiency of agricultural production in China. In addition to these measures, the government is moving to reduce the tax burden on farm households by publishing uniform tax code regulations for localities to follow.

# U.S.-China Bilateral WTO Agreement and Beyond

Francis Tuan and Hsin-Hui Hsu

**Highlights:** The bilateral agreement between the United States and China completed in November 1999 established the basic terms of China's accession to the WTO. The phaseout of the current system of unannounced import quotas, licensing, and state-owned trading monopolies will pose a significant challenge to China's agricultural policy, which has historically featured tight government control over agricultural trade.

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The comprehensive bilateral trade agreement reached between the United States and China in November 1999 specified the basic terms of China's entry to the World Trade Organization (WTO). By September 2001, multilateral negotiations on China's final terms of accession were concluded and China's entrance to the WTO is expected in late 2001 or early 2002 (see box), but the specific details of the multilateral agreement were not yet publicly available when this report was written. However, the terms relevant for commodities important to the United States are believed to be similar to terms negotiated in the 1999 U.S.-China bilateral agreement. The multilateral agreement may differ slightly from the bilateral agreement in some provisions. The multilateral agreement also includes provisions negotiated by other countries for some commodities, such as canola oil and wool, not included in the bilateral agreement. This article summarizes China's commitments on agricultural trade contained in the 1999 bilateral agreement that are expected to be similar to those in the multilateral agreement for China's WTO accession.

Under terms of the bilateral agreement, China committed to implement a series of tariff cuts, to allow private enterprises to participate in trade activities, and to eliminate nontariff barriers by 2004. In addition, China committed to establish tariff-rate quotas (TRQ) for wheat, corn, rice, soybean oil, and cotton with gradually increasing quota levels. Agricultural subsidies were a focal point in the multilateral negotiations,

but the final terms limited China's potentially trade-distorting subsidies to 8.5 percent of its value of agricultural output.

## *U.S.-China Agreement Highlights*

In the 1999 bilateral agreement, China agreed to reduce trade-distorting barriers and practices that fall into three main categories: nontariff trade barriers, domestic agricultural support, and export subsidies. Under the U.S.-China bilateral agreement, China committed to elimination of all nontariff trade barriers, leaving tariffs as the only measure affecting imports (table B-1). Nontariff measures, such as sanitary inspection, testing, and domestic taxes, will comply with WTO rules. Tariffs on all agricultural products will drop from an average of 22 percent to 17 percent by January 2004, and tariffs on U.S. agricultural products with high-export priorities (such as animal products, fruits, and dairy products) will drop to 14.5 percent.

The bilateral agreement established TRQs for a number of bulk commodities, including wheat, corn, rice, cotton, and soybean oil. For goods subject to TRQs, a specified quantity of imports (i.e., quota) may enter at a low tariff rate, and additional imports (i.e., over the quota) will enter at a higher tariff. The quantities allowed at the low tariff (within TRQs) were set to increase annually from 2000 through 2004, and the soybean oil quota was set to remain through 2005. (This statement is based on the agreement signed in

## China's WTO Chronology

Year	Month	Event
1986		People's Republic of China applies to join GATT.
1989		Tiananmen Square incident derails trade negotiations.
1994		China begins a new push to join GATT.
1997		China cuts import duties on many goods, but maintains high tariffs on others.
1999	April	China offers major concessions. The United States turns down the offer, but the two countries issue a statement committing to finish negotiations by 1999.
1999	November	U.S.-China negotiators agree on a bilateral agreement that will allow China to join the WTO.
2000	September	U.S. Senate passes legislation establishing permanent normal trade relations with China.
2001	June	The United States and China reach agreement on China's farm subsidies at 8.5 percent of the total agricultural output value.
2001	September	Multilateral negotiations on China's WTO accession concluded.

For details on U.S.-China agreements, fact sheets on China WTO impacts, and contact information for avoiding and resolving trade disputes, see U.S. International Trade Administration, "China Gateway."  
<<http://www.mac.doc.gov/china/>>.

1999. The multilateral agreement may contain slightly different dates or years.) There is no minimum purchase requirement and the negotiated TRQs do not represent minimum purchases. China does not have to import the full TRQ amount, but it did agree to establish regular grain purchases from the United States in 1999. By cutting tariffs on specified quantities of imports, China's quotas open the market to imports when domestic demand exceeds supply.

China has agreed to eliminate export subsidies for farm products and to cap trade-distorting domestic farm subsidies. Chinese farmers, however, are entitled to sell unlimited amounts of surplus grain to the state at protection prices. In multilateral negotiations, China was unwilling to enter the WTO as a "developed economy," which would limit trade-distorting farm subsidies to 5 percent of the value of agricultural output (at *de minimis* levels). The limit is 10 percent for developing economies. China considers its support of farm prices to be a crucial domestic policy instrument that protects farm household income and prevents social and political instabilities. A compromise reached in June 2001 set China's

subsidy limit at 8.5 percent of agricultural output value in the multilateral agreement.

The extension of trading rights to private sector entities will add transparency and competition to China's agricultural trade by phasing out the monopolistic power of state trading enterprises (STE), which still control all trade in some key commodities. Private sector participation and competition in trade will be encouraged by setting shares of imports to be allocated to nonstate trading entities. For many agricultural commodities, including oilseeds and oilseed products, cotton, and medium- and short-grain rice, half or more of imports were set to be allocated to nonstate entities. Trade in major grains, including wheat and long-grain rice, will continue to be channeled primarily through state trading enterprises. The non-STE share of corn imports was set to rise from 25 percent in 2000 to 40 percent in 2004. Private sector trading rights are one of the key terms negotiated in the bilateral agreement and will have a profound impact on Chinese markets.

In 1999, China also agreed to eliminate sanitary and phytosanitary barriers to agricultural imports that are not based on scientific evidence. For example, China

**Table B-1—China's tariff rate quota system after WTO accession**

Commodity	Unit	2000	2001	2002	2003	2004	2005
Wheat:							
Total TRQ level	1,000 tons	7,300	7,884	8,468	9,052	9,636	
In-quota tariff	Percent	1	1	1	1	1	
Over-quota tariff	Percent	77	74	71	68	65	
Allocated to nonstate trade	Percent	10	10	10	10	10	
Rice:							
Total TRQ level	1,000 tons	2,660	3,325	3,990	4,655	5,320	
Short and medium-grain quota	1,000 tons	1,330	1,663	1,995	2,328	2,660	
In-quota tariff	Percent	1	1	1	1	1	
Over-quota tariff	Percent	80	70	60	50	40	
Allocated to nonstate trade	Percent	50	50	50	50	50	
Long-grain quota	1,000 tons	1,330	1,663	1,995	2,328	2,660	
In-quota tariff	Percent	1	1	1	1	1	
Over-quota tariff	Percent	80	70	60	50	40	
Allocated to nonstate trade	Percent	10	10	10	10	10	
Corn:							
Total TRQ level	1,000 tons	4,500	5,175	5,850	6,525	7,200	
In-quota tariff	Percent	1	1	1	1	1	
Over-quota tariff	Percent	80	70	60	50	40	
Allocated to nonstate trade	Percent	25	29	33	36	40	
Cotton:							
Total TRQ level	1,000 tons	743	781	819	856	894	
In-quota tariff	Percent	1	1	1	1	1	
Over-quota tariff	Percent	69	62	54	47	40	
Allocated to nonstate trade	Percent	67	67	67	67	67	
Soybean oil:							
Total TRQ level	1,000 tons	1,718	2,027	2,335	2,644	2,952	3,261
In-quota tariff	Percent	9	9	9	9	9	9
Over-quota tariff	Percent	74	61	48	35	22	9
Allocated to nonstate trade	Percent	50	58	66	74	82	90
Soybeans:							
Bound tariff	Percent	3	3	3	3	3	
Soymeal:							
Bound tariff	Percent	5	5	5	5	5	

Note: All fully implemented by 2004, except for soybean oil, which is through 2005, and after which it converts to a bound, tariff-only regime.

Source: Office of the U.S. Trade Representative.

lifted its ban on imports of U.S. wheat and other grains from the Pacific Northwest and now allows the import of U.S. wheat that meets specific tolerances for TCK fungus (U.S. Trade Representative).

### ***Beyond the Bilateral Agreement, Internal Policy and Institutional Conflicts Are Expected***

China's terms of agreement may be incompatible with its domestic agricultural policy structure geared toward protecting farm production to maintain self-sufficiency. For example, China's commitment to replace its current import quota and licensing system with a TRQ system and phase out STE monopolies might imply that foreign companies would be given full trading rights and distribution rights in retail, wholesale, and transportation for grains and soybean products. This policy is clearly incompatible with China's agricultural marketing and distribution system—a system based on monopoly by the government over procurement and allocation of priority commodities. The agricultural marketing and distribution system in China is a complex system with interlocking policies and government institutions used to accomplish a mix of economic and policy functions.

WTO accession will require China to follow international standards of transparency in trade that will depart sharply from past practices. China has historically maintained tight state control over agricultural trade to control the flow of imports. Previously, no information was available to either foreign or even domestic businesses about how import quotas were set or about how quota assignments to local grain and oil importers were allocated. Prior to WTO accession, China never published complete import regulations or even a description of its import quota system. The only way to discern a quota amount was through *ex post facto* examination of trade flows.

In the past, quota amounts were determined by internal negotiations between central, provincial, and local governments. Usually, China's State Planning and Development Commission received requests from provincial governments and recommended a quota

amount, which was then reviewed and approved by the State Council and allocated to individual provinces through a negotiation process between central and provincial governments. The total national quota amounts and the allocation among provinces were often revised several times during the year, further complicating the process. A similar negotiation occurred between provincial and local governments to decide the final allocation to firms holding import licenses or government-owned business entities. In coming years, the public announcement of TRQs, allocation of import shares to non-STE businesses, and other laws and regulations related to import and export of agricultural commodities will increase openness and competition in China's trade.

After WTO accession, the allocation of imports is expected to be much more open and governed more by supply and demand rather than central planning. However, many barriers remain hidden in the transition and implementation period. For example, quota holders have no right to import directly from abroad, to choose their trading partners, or to choose a specific type of commodity (e.g., high-protein soybeans). Thus, beyond the bilateral agreement between the United States and China, there are various issues in the Chinese trading system that must be resolved.

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# Changes in Labor, Land, and Credit Markets Lead China's Farmers on the Path Toward Modernization

Bryan Lohmar

**Highlights:** Structural changes in China's economy are generating changes in agricultural production. In particular, China's rural markets for labor, land, and credit are responding to changes in the larger economy and facilitating a transformation in agricultural production. Reforms in the institutions that organize land and credit allocation, in tandem with increasingly lucrative nonfarm sources of income and freer labor markets, are providing farmers with more opportunity to take advantage of developing opportunities to specialize in cash crop production.

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As China's economy grows and becomes more open, the institutions and policies that affect the availability of critical inputs for agricultural production are changing. Movement of labor off-farm continues and the policies and institutions that discourage labor movement are eroding. Land-tenure practices are less idiosyncratic and capricious as formal laws to promote tenure security and rental rights have been established. New types of locally supported credit institutions have also been established, and more and more farm households are able to self-finance investments using savings from nonfarm income sources or seek private loans from households with such savings. This process of change and reform must continue if China's farmers are to compete on international markets.

With recent institutional and policy changes in the land, labor, and credit markets, more and more farmers are taking advantage of the new economic environment and making changes in their agricultural production patterns to increase their incomes. For example, farmers are increasingly turning to greenhouse cash-crop production, particularly in northern China. But to establish a greenhouse to grow cash crops (such as melons or other high-valued fruits and vegetables), households require an environment in which they feel comfortable producing cash crops and have access to credit, land-tenure security, and specific market infor-

mation that gives them the incentive, confidence, and ability to switch from subsistence crops (such as wheat and rice). Recent developments in the markets for labor, land, and credit have all contributed to creating such an environment in rural China, and all signs point to continued development of these important markets in the coming years.

## *The Rural Labor Market*

China's rural labor market and employment structure have changed dramatically in the last 20 years as millions of rural workers found nonfarm employment, often migrating to distant areas to find such jobs. China's official statistics indicate that the number of rural workers with nonfarm employment in local rural enterprises rose from 67 million in 1985 to 127 million in 1999, and the share rose from 18 to 28 percent in that period. It is unclear, however, how many workers leave their villages for extended periods for jobs in urban areas or self-employment activities because official statistics do not cover these areas. Estimates of the number of migrants in China ranged from 30 to 100 million by the mid-1990s, with the wide range of estimates stemming from different definitions of migration and different data sources. Data from the National Agricultural Census for 1996 indicate that roughly 57 million rural workers engaged in nonagricultural activ-

ities in urban areas that year. Many observers also believe that official estimates of nonfarm employment are low, perhaps extremely low, because they overlook many sources of casual employment and services such as restaurants, construction, trade, transportation, and marketing services. Lumping rough estimates of these categories together could raise official estimates by as much as 100 million workers (Rawski and Mead).

Despite the high rate of nonfarm employment generated in the past 20 years, the number of farmers in China actually may have increased. The estimates of the number of farmers finding nonfarm employment are large but are still somewhat modest compared with the size of the rural labor force (roughly 450 million in 1999). Also, in the years before the mid-1990s, the rural labor force expanded rapidly because new workers in this period were born before China established the “one-child” policy in 1978, and the population growth rate before this policy was instituted was high. Official estimates of the number of rural workers relying entirely on agriculture are greater today (350 million) than they were in 1980 (300 million). If the most-ardent skeptics of official statistics are correct (those that believe the official nonfarm employment numbers are too low by 100 million), then the number of full-time farmers in China may have fallen to 250 million in the past 20 years. This figure still equates to a large number of farmers.

A variety of policies and institutions are thought to discourage the movement of rural labor into nonfarm employment in China. Most of the rural migrant workers who headed for urban areas in the 1990s were met by policies specifically intended to discourage rural-to-urban migration, such as the “household registration” (*hukou*) system. Occasional anti-migrant campaigns and other policies that made it difficult for migrants to bring their families to urban areas also served to discourage rural workers from seeking jobs in the cities. Despite these policies, the differences between urban and rural incomes were too great, as was the demand for labor in hard and dangerous jobs that urban workers were unwilling to take, and the flow of labor from rural areas to urban areas continued.

In the past, policies and institutions at the village level also discouraged movement into nonfarm employment, particularly movement by whole households. Studies indicate that family or political connections were important for accessing jobs in rural enterprises because local leaders often rationed these jobs.

Deposits and fees to access rural industrial jobs also served as a barrier to nonfarm employment. In addition, because households lose their land-use rights if they leave the village, land-tenure practices also discourage labor movement out of agriculture. Others argue that grain-quota delivery policy, whereby farmers are obligated to sell a fixed amount of grain to the state, serves to “keep” farmers in agriculture.

The reform of policies that discourage labor mobility and access to nonfarm employment has begun. Starting with the early-1990s campaign that promoted “leaving the village without leaving the countryside” (*li cun bu li xiang*), China’s leaders have encouraged rural laborers to seek work in nearby towns, rather than cities. This policy was primarily motivated by the desire to increase employment opportunities for the enormous rural labor force without threatening the stability of urban areas. In addition, most rural enterprises no longer ration jobs or favor workers with connections as they once did because these enterprises have faced an increasingly competitive environment and have been forced to adopt hiring policies that raise productivity and reduce costs. Land-tenure security is also increasing so that rural households with migrant workers are less likely to lose land, and several provinces have announced that they will no longer enforce mandatory grain-quota delivery policies. In recent years, some villages became more active in trying to generate nonfarm sources of income for farmers, often by promoting activities that lower the costs of searching for jobs. Increasingly, county-, township-, and village-level labor offices are promoting migration and other paths to nonfarm employment.

By the late 1990s, many urban leaders began to establish, on a small scale, policies to encourage and facilitate certain types of labor movement into cities. Recognizing the critical role rural migrants play by filling important but undesirable jobs in their cities, such as construction and trash collection, urban officials implemented policies that made it easier for migrants to live and work in the cities, such as creating legal spot labor markets and curtailing crackdowns on migrants. Recently, China’s government has stepped up efforts to reform the household registration system, and many speculate that the system will soon be abolished.

The changes in China’s labor market are affecting agricultural production in many ways. For example, the rapid growth in nonfarm employment may be reducing the overall supply of labor for agricultural

production, at least from the levels that would exist without nonfarm employment. Farmers are increasingly comparing returns from agricultural work to potential earnings in nonfarm work. This comparison encourages farmers to raise their productivity in farm work. In addition, off-farm sources of income increase household wealth and allow farm households to self-finance small investments. China's increasingly mobile rural labor force also benefits agricultural producers by lowering transaction costs. Information received through off-farm workers, particularly workers who migrate to local towns and urban areas, has facilitated farmers' movement from subsistence production to production of cash crops for distant markets.

### ***The Rural Land Market***

China's agricultural economy faces a scarcity of land, accounting for only 7 percent of the world's arable land resources. Exactly how much land China uses for agriculture is unclear. Before the Census of Agriculture, which reported farm household data for 1996, official statistics showed the amount of cultivated land in China was below 100 million hectares and falling, from 95.67 million hectares in 1990 to 94.97 million hectares in 1995. The 1997 Census of Agriculture, however, revealed that cultivated area was 130.04 million hectares in 1996, much larger than earlier official estimates. The pre-census estimates were based on an administrative reporting system that tended to underestimate cultivated area, since land endowments are used to determine local tax obligations. Pre-census estimates of sown area are believed to have been more accurate.<sup>1</sup>

The potential for expanding cultivated land in China is extremely limited. Urban industrial, commercial, and residential uses are competing with agriculture for China's limited land resources. By 2020, China expects to have at least 50 percent of its population living in urban areas, up from 36 percent in 2000. In addition, China has begun to take fragile land out of agricultural production for environmental reasons. Much of this land is being reverted to wetlands, forests, or grasses. It will be difficult to make up future losses of land through expanding double cropping. In most of the areas where double cropping could be introduced, at least one crop would have to rely on scarce irrigated water.

<sup>1</sup> China's statistical reporting services have not reported sown acreage since the census adjustment in 1996.

More efficient use of China's existing agricultural land may be a solution to some of its land-availability issues. Due to a variety of land-tenure policies, the *right to independently transfer* land between households in rural China has not always been clearly extended to farm households. With increasing nonfarm employment opportunities and growing recognition that economies of scale can be achieved by consolidating farmland, farmers have begun to demand independent land transfer rights. Local and national policymakers have responded by offering new land-tenure arrangements that could significantly affect agricultural production in China.

Farmers in China do not have full ownership rights to the land on which they farm. Instead, the land is usually owned by a collective group (or *xiaozu*, roughly 30-40 households) or, sometimes, the village itself. The owners then allocate among their constituent farm households *rights to farm* plots of the collectively owned land. Several different bundles of rights are extended to farm households in China, including the *right to residual income*. The ownership entity generally maintains the *right to reallocate* land among the constituent households.<sup>2</sup> When the right to reallocate is exercised by the collective or village leaders, farm households risk losing the plots they had farmed, and households may or may not get comparable plots. While reallocation policies are intended to ensure egalitarian access to land and a subsistence safety net for farm households, the reviews of land distribution and occasional land reallocation at the village and *xiaozu* levels also generate significant land-tenure insecurity in rural China.

Policies that increase tenure security and extend the rights to independently transfer land to other farm households have become more common. The 1998 Land Management Law explicitly mandated providing use rights for 30 years to farm households and contains language intended to limit land reallocation to only small adjustments in isolated cases. While the wording of the laws defining when leaders can reallocate land is still not entirely unambiguous, the national government policy to increase tenure security for farm households is less ambiguous than previous national reallocation policies. Land management practices are also changing at the local level. According to surveys and interviews conducted in rural China, an increasing

<sup>2</sup> This right is not usually exercised without some input from the households involved.

number of villages extended full rental rights to farm households in the 1990s.

Land-tenure insecurity and the overall land allocation system have several effects on agricultural production. Researchers have shown that land-tenure insecurity discourages investment in inputs that have a long-term payoff, such as organic fertilizer. In addition, tenure insecurity, and the general lack of formal rules governing independent land transfers between households, hinders the development of a land-rental market. These policies reduce productivity of the land by decreasing investment and discouraging land transfers from low- to high-productivity users. Land-tenure security also facilitates independent transfers.

Land-tenure policies affect the markets for other important farm inputs, such as credit and labor. Because farm households do not own their land, they cannot use it as collateral in the credit market. In addition, active village land reallocation may discourage farm households from seeking nonfarm employment due to fears of losing land. Fear of losing the land may also discourage land-rental activities, making it more difficult for households to commit labor to off-farm employment.

### ***The Market for Rural Credit***

Lack of credit hinders agricultural investment and productivity. Because farm households in China do not own land, they lack a key piece of collateral that is used to secure agricultural loans in most other countries. Formal credit institutions in China are poorly developed and are generally state-owned or state-supervised institutions that favor loans to rural industry, rather than small loans to farmers to increase agricultural production efficiency. China's credit institutions are also char-

acterized by high transaction costs that discourage households from applying for small loans. Little research has been done on the specific terms facing farmers when they seek credit from formal institutions to invest in agricultural production technologies.

The main credit institutions in rural China are the Rural Credit Cooperatives (RCC), which are cooperatives in name but are closely supervised by the state banking system. China has over 50,000 township-level RCCs and over 250,000 village credit stations operated by the RCCs. In addition, the Agricultural Bank of China has some representation, and in the 1990s local governments established Rural Credit Funds and Mutual Aid Funds to provide small loans for agriculture or emergency consumption needs in many areas. As their private savings increase, households are increasingly relying on informal credit institutions. The number of self-financed loans made privately increased significantly in the 1990s, and more and more of the private loans are interest bearing, representing a private credit market developing in rural China.

Increasing access to credit affects farm households' agricultural production decisions. Access to credit allows farmers to buy better seeds, as well as the fertilizers and pesticides that are often used in conjunction with hybrid and high-yielding seed varieties. Credit also enables farmers to invest in fixed, long-term inputs, such as a greenhouse or water-saving irrigation technology.

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# Subsidized Corn Exports Help Prices Rebound

Fred Gale

**Highlights:** In 2001, corn prices in China rebounded from the low levels seen during 2000. A second straight year of drought will result in another relatively small corn crop. Corn exports are not likely to return to the high levels seen during 2000. China's corn exports are highly uncertain because they depend on internal government decisions about continued export subsidies, the level and condition of government-held stocks, and the timing of China's WTO entry.

Corn prices rose in the first half of 2001, a reversal of steady declines in 1999 and 2000, but prices were still well below the peak levels of earlier years. Corn prices have had wide swings over the past 10 years, and 2000 was the trough of a 6-year fluctuation (fig. D-1). Corn prices peaked in 1995 at levels that were 60 percent higher than in 2000. Thus, while prices rose in 2001, they are still well below historical highs. Corn prices are, however, above world prices, which will tend to keep China corn prices from rising further, especially as WTO accession approaches.

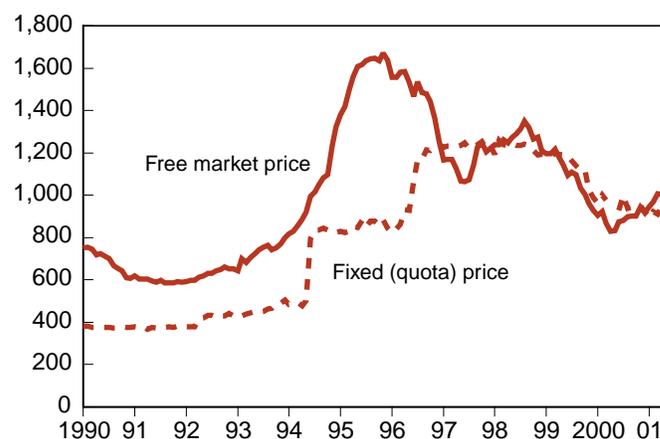
China's corn sector is still experiencing the after-effects of a record harvest in 1998. Reportedly, storage facilities were filled beyond capacity in 1999 and 2000. Abundant supplies of corn drove prices down, making it impossible for grain bureaus to sell off stocks of corn bought at higher prices in earlier years. The government has been under pressure to reduce stocks during the last 2 years and has done so by limiting procurement of new grain, subsidizing export sales, and cutting off imports.

A fall in production and a surge in subsidized exports during 2000 probably relieved pressure on corn stocks (table D-1). During 2000, plunging corn acreage and severe drought in corn-growing areas cut production by an estimated 18 percent. China does not publicize information on corn stocks, but some analysts estimate that stocks may have fallen by 20 million tons during 2000 (see "USDA Revision of China Grain Stock Estimates" in this report).

Figure D-1

## Monthly China corn prices

Yuan per ton



Note: The quota price is the price paid by government grain bureaus to farmers for grain delivered to fulfill mandatory quotas. It is known as procurement price and protection price. The free-market price is the price determined in the emerging free markets for grain, including private traders and mills.

Source: China's Ministry of Agriculture.

China's corn production during 2001/02 is expected to be hurt by a second straight year of drought. Severe drought early in the growing season affected the north-eastern corn crop. Summer rains relieved the north-eastern drought, but another drought occurred in central China, damaging the crop in that region. Corn acreage in China in 2001/02 is estimated slightly higher than 2000/01. Corn production for 2001/02 is projected to be 108 million tons, slightly higher than

**Table D-1—China's corn production, trade, and stocks, 1998/99-2001/02**

Item	1998/99	1999/2000	2000/01	2001/02
	<i>Million tons</i>			
Production	133.0	128.1	106.0	108.0
Imports	0.3	0.1	0.1	0.2
Exports	3.3	9.9	7.0	4.0
Ending stocks	102.1	102.3	81.4	61.6

Note: Crop year is October through September.

Source: U.S. Department of Agriculture, *World Agricultural Supply and Demand Estimates*, October 12, 2001.

the 106 million tons in 2000/01, again well below high levels of earlier years.

In large corn-producing provinces of the north China plain, such as Shandong and Henan, attractive prices for cotton and other cash crops may have reduced corn area for 2001/02. Cash crop alternatives are more limited in the colder northeastern provinces (such as Jilin, Liaoning, Heilongjiang and Inner Mongolia) (fig. D-2). Procurement prices set by the government strongly favored corn over soybeans, helping to boost corn area in northeastern provinces where soybeans are the chief competing crop (see "Policy Changes Continue to Affect China's Oilseeds Trade Mix" in this report).

### ***Corn Exports Subsidized***

In most years, China is a major exporter of corn. Its exports go mostly to other Asian countries, primarily South Korea, Malaysia, Indonesia, and other countries of southeastern Asia (fig. D-3). Year-to-year fluctuations in China's exports make the country a key factor in international corn markets. As with most other commodities in China, the corn trade is difficult to predict because it is conducted by state trading entities and is guided largely by internal policy decisions and domestic stock levels that are not revealed to the public.

China's corn exports were about 10 million tons for the 1999/00 marketing year. Despite poor harvests during that year, the total tonnage represents one of the country's highest-ever corn export volumes. Corn exports for calendar year 2000 were up 143 percent over the previous year. Corn exports continued at a strong pace during the first 3 months of 2001, at nearly 2.3 million tons, but slowed in subsequent months. Most of the 2001 exports went to South Korea and Malaysia.

Since domestic corn prices are substantially above world prices, export subsidies are needed to sell corn on world markets. In 2000, the central government provided a \$31 per ton subsidy that was supplemented by an additional \$13 per ton subsidy from the Jilin provincial government. The total subsidy for Jilin corn was \$44 per ton. Jilin, a major corn-producing province in northeastern China, plays an increasingly prominent role in China's corn export business.

### ***China Corn Exports Likely To Shrink as Subsidies End***

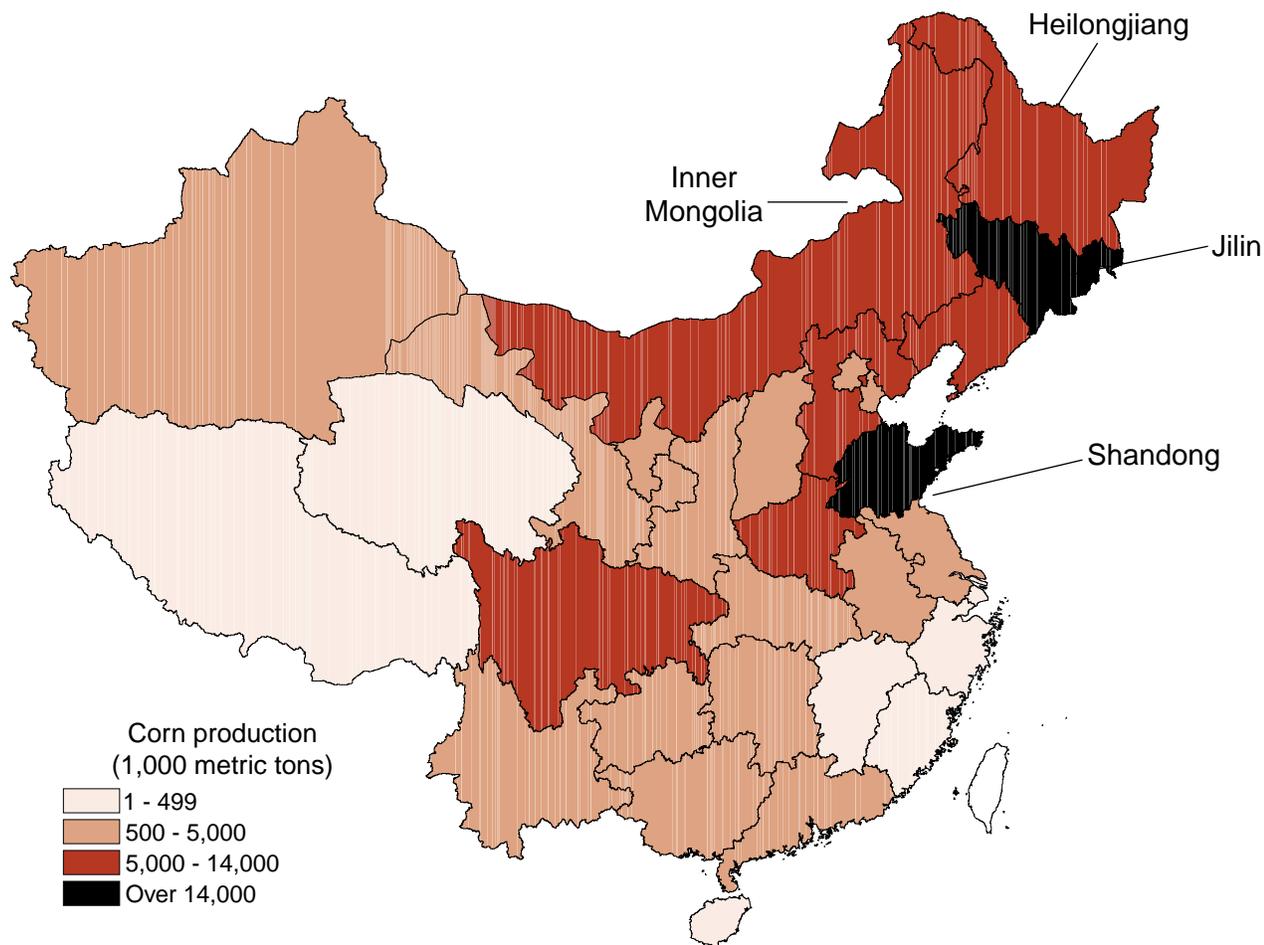
Early in 2001, there was much speculation about whether export subsidies would continue. China's export subsidies will be eliminated upon the country's entry into the WTO, but the timing of China's WTO entry was still uncertain. Correspondingly, there was great uncertainty (both inside and outside China) about whether export subsidies would be offered. Rising domestic corn prices also worked strongly against exports, and the growing gap between domestic and world prices increased the potential cost of export subsidies.

China's WTO entry will have a major impact on its corn sector. According to the terms of the 1999 U.S.-China bilateral agreement, China established a 4.5-million-ton tariff-rate quota for corn that would rise from 5.85 million tons in 2002 to 7.2 million tons in 2004 (see "U.S.-China Bilateral WTO Agreement and Beyond" in this report). Imports within the quota would be subject to a low 1-percent tariff, and over-quota imports would be subject to a prohibitive 80-percent tariff that would fall to 40 percent by 2004. Perhaps more important, the monopoly of state-controlled trading enterprises over import and export of corn would be reduced. Nonstate trading companies would be allocated a share of the quota that would rise to 40 percent by 2004. However, the agreement neither defined what constitutes a nonstate trading entity nor specified the mechanism for allocating imports to nonstate entities.

After WTO accession, China could swing from a net exporter to a net importer of corn. Most corn imports would be used to feed livestock in China's corn-deficit southern provinces, while northern provinces would continue to supply most of their own corn. Competition from imports would reduce domestic prices for corn, leading to less corn acreage and production in China.

Figure D-2

**Corn production by province, 1999**



Source: *China Rural Statistical Yearbook*, 2000.

China's livestock industry, however, would likely expand with access to cheaper feed.

***China a Net Importer?***

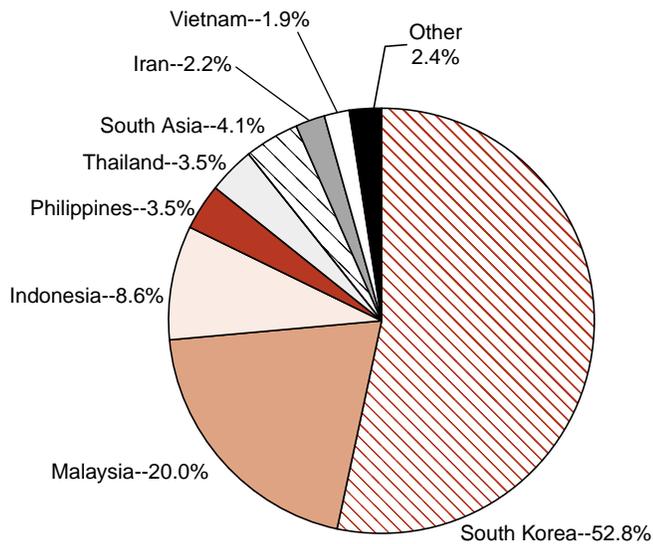
Rising incomes in China are expected to boost demand for meat, thereby increasing demand for corn to feed growing livestock numbers. According to USDA's long-term projections to 2010 (under a scenario that does not assume WTO accession), China is projected to shift from being a net corn exporter to a net corn importer midway through the projection period. China is expected to continue to export 2-4 million tons of corn to eastern and southeastern Asia throughout the entire period, far less than the country's recent peak of 10 million tons exported in 1999/00. Imports are

expected to reach 4-6 million tons by the end of the projection period, significantly higher than the 150,000 tons estimated for 2000/01.

Projecting China's long-term corn supply and demand is extremely difficult. In particular, two critical factors are largely unknown: (1) the pace of structural change in China's livestock industry from backyard enterprises to specialized commercial operations, and (2) the growth in use of coarse grains and protein meals in feed rations (Fang et al.). Relatively small changes in the structure of the livestock sector or in commercial feed use could have a strong impact on the demand for corn. The implementation of China's new regulations governing genetically modified organisms could have an important effect on imports of corn and soybeans.

Figure D-3

**China corn exports by country, 1999/2000**



Note: South Asia includes India and Bangladesh.  
 Source: China Customs statistics.

**Room for Efficiency Gains**

China's system of corn production is inefficient. Most corn is grown on small plots of less than one-half hectare, and the process is labor intensive. Low funding levels constrain the effectiveness of China's large agricultural research and extension infrastructure, but progress is being made.

China's farmers are not well aware of the benefits of rotating corn and soybeans, and government procurement prices have traditionally encouraged corn production over soybeans. Thus, northeastern China has tended to export corn while simultaneously importing substantial quantities of soybeans. China's corn exports (10.5 million tons) were roughly equal to its soybean imports (10.4 million tons) in calendar year 2000. In recent years, soybean production has

increased, especially in Heilongjiang province, and the benefits of corn-soybean rotation are being disseminated to growers. In early 2001, Jilin province announced a plan to increase acreage devoted to corn-soybean rotation by two-thirds, from 3 million mu (200,000 hectares) in 2000 to 5 million mu (333,333 hectares) in 2001.<sup>1</sup> A decrease in the high corn-soybean price ratio would reinforce the movement toward corn-soybean rotations.

China is also exploring demand-side initiatives to help the corn sector that are familiar to U.S. observers. At least one proposal has been made for a national policy encouraging production of alcohol fuel additives made from corn, and several provinces are already moving in this direction. Alcohol fuel production facilities have recently begun operations in Henan and Heilongjiang provinces, and Jilin province has announced construction of a large plant that will begin production in 2002. This is a key project in the 10th Five-Year Plan.<sup>2</sup> Jilin officials have also called for greater development of value-added processing of corn in the province. China's motivations are similar to those motivating U.S. proponents of value-added initiatives: boost demand for corn and farm income, create employment opportunities, cut dependence on oil imports, and reduce air pollution.

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<sup>1</sup> 1 mu = 0.0667 hectares = 0.1647 acres.

<sup>2</sup> China's 10th Five-Year Plan is the government's economic development plan for years 2001-2005.

# Surplus Wheat Production Brings Emphasis on Quality

Hsin-Hui Hsu, Bryan Lohmar, and Fred Gale

**Highlights:** China's wheat imports have been minimal in recent years, following huge harvests in the 1990s that were the culmination of policies aimed at raising wheat production. Wheat production has fallen due to lower prices and the government's recent emphasis on wheat quality rather than quantity. Demand for high-quality wheat is rising as consumers switch from traditional noodles to breads and other bakery products. Future wheat imports will be moderate as China's wealthier consumers demand quality over quantity.

China's wheat production fell 12.5 percent in 2000/01 to less than 100 million tons, as planted area declined in response to falling prices and reduced government support (table E-1). The National Bureau of Statistics' crop acreage survey indicated that wheat sown area fell again in 2001/02 by 4.9 percent. Current U.S. Department of Agriculture (USDA) estimates show that wheat production will be 94 million tons in 2001/02. Imports are expected to be modest in 2001/02, at a projected 1 million tons, marking the fifth consecutive year of wheat imports under 2 million tons.

Historically, China has been a heavy importer of wheat; annual imports exceeded 13 million tons in the early 1980s when the country implemented open-door policies. Policymakers sought to reduce dependence on wheat imports by raising procurement prices during

the 1980s and 1990s. Wheat procurement prices peaked in 1996 at more than five times the level of the late 1970s (fig. E-1).

Introduced in 1995, the "Governor's Grain Bag" (*mi dai ze*) policy put further pressure on provincial governments, especially those of grain-importing provinces, to achieve local self-sufficiency in grain. In response, local officials raised grain procurement prices to increase production of grains. This policy culminated in a huge wheat harvest of 123.3 million tons in 1997/98, more than twice the 55.2 million tons produced in 1980/81. As prices fell, grain bureaus were unable to sell wheat procured at higher prices, and grain inventories became a financial burden.

With bulging grain inventories, the government has cut back imports. China's wheat imports fell from a historical high of 15.8 million tons in 1991 to 1.2 million tons or less since 1997/98. Production and consumption patterns in China suggest that wheat imports will not approach the high levels seen in the early 1990s. In the near term, barring major droughts and subsequent production shortfalls, China is likely to hold down imports to continue reducing stocks in preparation for its accession to the World Trade Organization (WTO). However, China's severe drought in 2001 may change its wheat outlook by forcing the country to cut production faster than anticipated. USDA's long-term forecast (a scenario that does not include WTO accession, the timing of which was still not finalized when this report

**Table E-1—China's wheat production, trade, and stocks, 1997-2002**

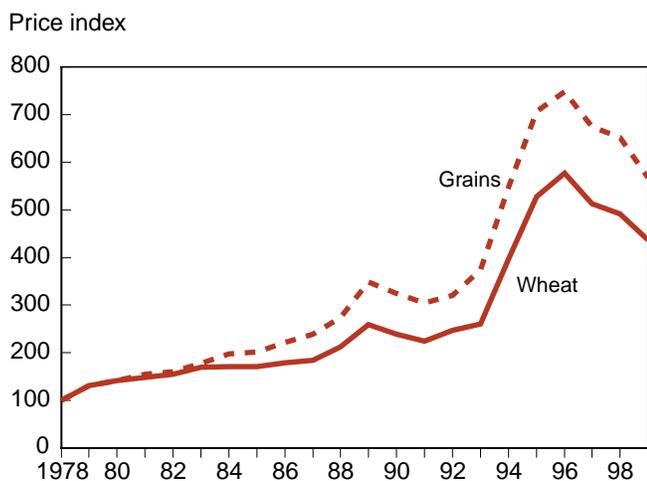
Item	1997/98	1998/99	1999/00	2000/01	2001/02
	<i>Million tons</i>				
Production	123.29	109.73	113.88	99.64	94.00
Imports	1.92	0.83	1.01	0.30	1.00
Exports	1.16	0.54	0.54	0.62	0.50
Stocks	71.12	66.44	65.16	50.48	31.98

Note: Crop year is July through June.

Source: U.S. Department of Agriculture, *World Agricultural Supply and Demand Estimates*, October 12, 2001.

Figure E-1

**Government procurement price indices for wheat and major grain crops, 1978-99**



Note: 1978=100.

Source: *China Statistical Yearbook*, 2000, p. 303.

was written) is for China’s wheat imports to rebound to 2.8 million tons by 2002/03 and then rise to 3.9 million tons by 2010. China’s WTO accession could boost import numbers, but the overall demand for wheat would still grow at only a moderate rate.

***Demand Growth Will Be Modest***

China’s wheat demand will grow at a modest pace as population growth slows and consumers diversify their diets. China currently accounts for about one-fifth of the world population, but its growth rate will slow to zero by 2035. China is expected to account for only 12 percent of world population growth between 2000 and 2020 and 5 percent of growth between 2020 and 2040. Thus, based purely on population projections, China may not be a major source of wheat demand growth in the future.

Per capita wheat consumption in China may not grow either. In fact, recent consumption trends in China and the experiences of middle-income Asian countries suggest that per capita wheat consumption may actually decline by a substantial amount as incomes rise, countering the effects of population growth. China boosted per capita wheat consumption in the early years following reforms in the 1970s and 1980s. Per capita consumption of wheat and rice by rural households jumped 85 percent from 1977 to 1984, while consumption of coarse grains dropped. China’s consumers now seem to have reached a point where grain consumption will not benefit from further

increases in income. From 1977 to 1989, consumption of fine grains paralleled the increase in rural income, but the subsequent rise in rural incomes from 1989 to 1996 saw no increase at all in fine grain consumption (fig. E-2).

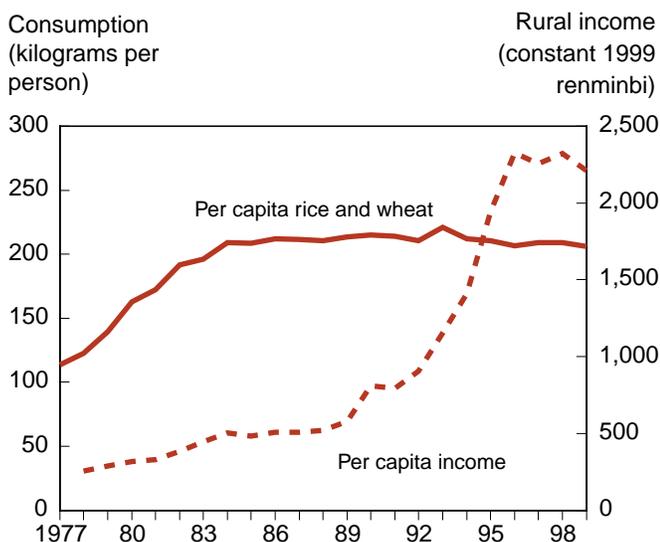
Urbanization and transition from subsistence agriculture to a market-based rural economy may also be reducing per capita food grain consumption in China. Currently, most grain is consumed by the rural households who grow it. Over 60 percent of China’s population live in rural areas, and rural per capita grain consumption is nearly three times the level of urban per capita consumption (fig. E-3). In 2000, per capita grain consumption was 249 kg for rural households and just 82 kg for urban households.<sup>1</sup> Statistical publications do not report nationwide per capita consumption of wheat alone, but the rural-urban difference in wheat consumption is likely similar to that of grain.

As China’s urbanization rate increases, rural consumers will consume less grain as they adopt urban lifestyles and diversify their diets. Until recent years, rural households had little access to food markets, little cash to purchase food, and no refrigerated storage for perishable foods. They relied on wheat and other grains for a large part of their diets because they could grow grain themselves and store it for long periods without spoilage. As China’s farmers move from subsistence agriculture into the commercial economy, they reduce their grain consumption. Rural consumers no longer need to grow their own food, since they have access to markets where a variety of food items can be purchased. Access to refrigeration for storing perishable items is also more common. Thus, the importance of wheat and other food grains in the Chinese diet will decline as urbanization shrinks the number of rural farm households. China’s urban population share is likely to rise from its current 36 percent to 50 percent within two decades. The stark difference between rural and urban grain consumption levels suggests that the rising urbanization rate will cut national per capita consumption.

<sup>1</sup> Others report less rural-urban difference in food grain consumption. Huang, Rozelle, and Rosegrant (1999) reported urban per capita grain consumption of 172 kg in 1994, well above the 102 kg reported for the same year in *China Statistical Yearbook*. The discrepancy may come from food consumed outside of the home by urban residents that is not captured in the official statistics. The problem of not including grain consumed outside of the home, or converting processed foods into grain equivalents, is pervasive in the data available to study grain consumption in China. The problem will worsen as incomes grow, increasing demand for food services outside the home and processed foods.

Figure E-2

**Rural per capita fine grain consumption and income, 1977-99**



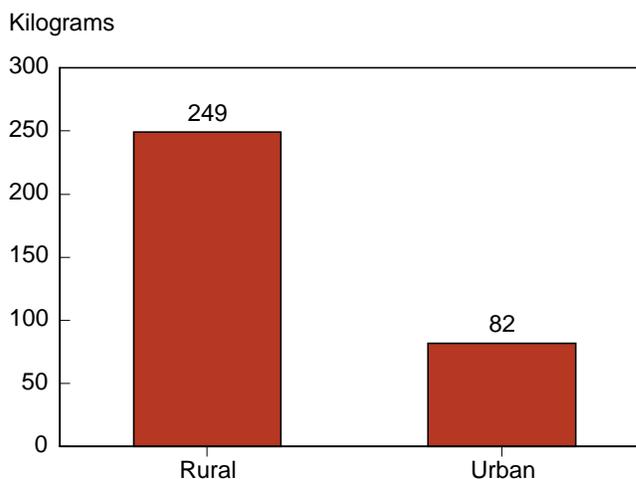
Source: *China Rural Statistical Yearbook*, 2000.

Rural consumers who remain on farms are also reducing their wheat consumption as the rural economy modernizes. Increasingly, farms are growing commodities that can be sold for cash, such as cotton, oilseeds, fruits, vegetables, fish, and livestock products. At the same time, food markets are becoming more common in rural areas, making a wider variety of foods available to farm households, who now have the cash to purchase those foods. Refrigerators, nonlocal foods, and restaurants are also becoming more common in the more prosperous rural areas. Statistical publications do not report rural wheat consumption on a nationwide basis, but anecdotal reports suggest that wheat consumption is falling. Statistical yearbooks for the central province of Anhui report a 10-kg (over 10 percent) decrease in rural per capita wheat consumption during the 1990s.

Increasing use of wheat in processed foods and meals away from home will partly offset declining at-home consumption of wheat flour. China's per capita grain consumption statistics do not include grain consumed in meals eaten away from home. In 2000, 14.7 percent of urban food expenditures went for meals away from home. In rural areas, the average expenditures for away-from-home meals were 4-5 percent. Chinese consumers increasingly patronize restaurants and food stalls that serve noodles, dumplings, breads, and Western fast foods, including hamburger buns and biscuits, all of which use wheat flour. Many processed

Figure E-3

**Per capita grain consumption, rural and urban China, 2000**



Note: Estimates based on household surveys that do not include consumption away from home or consumption of manufactured food products.

Source: *China Statistical Abstract*, 2001.

foods that use wheat flour are also excluded from per capita wheat consumption statistics. Instant noodles, cakes, and cookies and other manufactured foods also are emerging as important uses of wheat. Many of these products use more refined flour, which requires a larger quantity of wheat to produce a given amount of flour. Rising consumption of restaurant meals and processed foods may do much to offset declining at-home consumption of wheat, but the failure of China's statistics to capture this segment of consumption makes it difficult to monitor how much wheat is going into these foods.

Per capita wheat consumption will likely decline most sharply in northern China, where wheat is the traditional staple food and is used to make noodles, steamed bread, and dumplings. In southern China, from the Yangtze River basin southward (where rice is the traditional staple), per capita wheat consumption may increase as wheat-based food products from northern China and overseas become more popular. In the wealthy southern province of Guangdong, rural per capita consumption of rice fell by 14 kg between 1990 and 1998, reflecting the effect of urbanization and marketization. Over the same period, per capita consumption of grains other than rice (probably wheat) in rural Guangdong doubled from 12 kg to 24 kg. The Guangdong data suggest that southern rural

households are increasing their consumption of wheat products. However, since the increase begins from a low base, it may not be enough to offset the declines in northern China.

### ***Greater Attention to Quality in Wheat Production***

Traditional foods—noodles, steamed bread, and dumplings—still account for most wheat use in northern and northeastern China, but growing demand for breads, cakes, and other processed foods is increasing the demand for special types of wheat suited for these products. Bread makers tend to demand high-protein and high-gluten wheat, while makers of cakes and crackers tend to demand low-protein wheat. Most of China’s wheat falls between these two extremes. Processors commonly complain that the wheat they receive is not homogeneous or of a specific type or quality. Most mills in southern China complain that insufficient imports of quality wheat are hurting the domestic bakery business.

Over the past several decades, China’s wheat policy focused on quantity rather than quality. Now finding itself burdened with surplus low-quality wheat, the government is making a new push to improve domestic grain quality.

One notable step the government has taken is its reduction or elimination of procurement prices in

selected regions where wheat tends to be low in quality. In 1999, the State Council announced that procurement prices would be eliminated for year 2000 spring wheat grown in China’s northeastern provinces, including Heilongjiang, Jilin, Liaoning, eastern Inner Mongolia, northern Hebei, and Shanxi areas. In 2001, some spring wheat area in northeastern China was switched to soybeans or alternative cash crops. Procurement prices also were terminated for all wheat grown south of the Yangtze River.

The government also introduced a new set of quality standards for wheat on April 1, 2000 (table E-2). Wheat grades were established with specific end uses in mind. “Quality” wheat includes both high-gluten varieties that are good for Western-style bread and bakery products and low-gluten/low-protein varieties for cookies, cake mixes, and crackers. High-gluten wheat is further classified into two grades based on gluten and protein content. “Regular” wheat is classified into five grades on the basis of weight, percentage of imperfect grains, and foreign materials. All grades must also meet minimum standards for foreign materials, moisture, color, and smell. Since quality wheat includes both high- and low-gluten wheat, the term “special-use” may be more appropriate. Some farmers have misinterpreted quality to mean cleaner, heavier, or organically grown wheat.

Although authorized mills can buy directly from individual farmers, mills typically do not buy small

**Table E-2—Wheat quality standards and different end-uses in China**

Quality/Grade	Crude protein	Minimum	Maximum	Type of wheat	Uses
		container weight	imperfect grains		
	<i>Percent dry</i>	<i>Grams per liter</i>	<i>Percent</i>		
Quality high-gluten wheat:					
Grade 1 (wet gluten at least 35)	15	770	6	Durum	Pasta, spaghetti
Grade 2 (wet gluten at least 32)	14	770	6	Hard	Bread, buns
Quality low-gluten wheat (wet at most 22)	11.5	750	6	Soft	Cake mix, biscuits
Regular wheat (protein level)	na	710-790	6-10	Mixed	Wonton, dumplings (13) Cantonese yellow noodles (12-13) Dry white noodles (10.5-12.5) Steamed bread (10.5-12.5) Instant noodles (10.5-12)

Note: na = not applicable. Minimum standards for moisture content (no more than 12.5 percent), foreign materials (no more than 2 percent), and normal color and smell were also specified for all grades. Falling rate, dough stabilization time, and baking value were specified for quality wheat grades.

Sources: China State Bureau of Technical Supervision, “Quality Standard of Staple Grain,” Beijing, November 1999; David Shelton, Wheat Marketing Center, Inc., Washington, DC.; Australian Wheat Board.

amounts of quality wheat from individual farm households, because certification, shipment, and storage is cumbersome. In practice, state-owned grain procurement stations and mills sign contracts with a group of producers at the village level to acquire large amounts of high-quality wheat. Premium-grade wheat, however, often lacks homogeneity—poor-quality wheat is frequently found mixed in with high-quality batches. Mills are not satisfied with current premium varieties and often blend domestic wheat with imported wheat to improve quality and make better flour.

China has developed several high-quality, high-gluten wheat varieties with a minimum of 14 percent crude protein (whole kernel, dry basis), but low-gluten varieties are few and it is unclear whether farmers have an incentive to adopt these new varieties. State-owned grain stations pay a 10-percent premium for high-quality wheat, but this premium does not appear to make up for the lower yields of the high-protein and high-gluten varieties. Some local procurement officials, however, used the new standards to reject or pay discounted prices well below protection prices for many farmers' wheat deliveries. Some observers suggested that local grain bureaus were using wheat standards as an excuse to reject grain in order to prevent their burdensome wheat stocks from growing even more. The potential rejection of a farmer's wheat may induce farmers to plant high-quality wheat without adequate price incentives if alternatives to wheat are unavailable to the farmer.

Statistics indicate that high-quality wheat acreage is expanding. A National Bureau of Statistics survey of 2000/01 winter wheat sown area showed a 7.2-percent increase in "quality winter wheat" area, even though overall winter wheat area decreased by 2.3 percent. The National Grain and Oils Information Center (NGOIC) estimated that total quality wheat area would reach 3.9 million hectares in 2001/02.<sup>2</sup> NGOIC estimates that quality wheat area has expanded from 4.5 percent of total wheat area in 1998 to 16 percent in 2001. NGOIC estimates that quality wheat production was 16.5 million tons in 2001/02, 17.5 percent of total wheat production. The Ministry of Agriculture has published a target for premium grade quality wheat of 20 million tons by 2005 (Yang).

While statistics show rising high-quality wheat acreage in China, the increase is apparently not enough to keep up with demand. Millers claim that there is still demand for wheat quality types that is not being met through domestic production. Millers express considerable interest in purchasing imported quality wheat, which has been scarce due to low import volumes in recent years. Wheat exporters in the United States and other countries should see rising sales of high- and low-protein wheat to China, especially after the country's WTO accession. It remains to be seen whether China's domestic wheat producers will eventually achieve a quality mix that better matches domestic demand.

### ***Investment Needed to Expand Production***

China's wheat production has grown significantly over the past 40 years. Before implementing agricultural reforms in the late 1970s, China expanded wheat production primarily by devoting more inputs to wheat production—more acreage, irrigation, and labor. After rural reforms began in 1978, grain production rose rapidly as institutional reforms made inputs more productive. From 1978 to 1985, wheat production increased at an average annual rate of 6.9 percent, faster than production increases in rice, corn, or soybeans. From 1986 to 1995, however, annual wheat production growth slowed to 1.6 percent. Production surged again during 1995-97—mainly due to increases in land and other inputs in response to the Governor's Grain Bag policy—but productivity gains were still small (Colby, Diao, and Somwaru).

The shift in input use spurred by the Governor's Grain Bag policy during the mid-1990s has reversed in recent years as China adjusted to the resulting massive grain surpluses. Any growth in future wheat production will have to come from productivity gains because land and labor inputs are likely to move out of wheat production. Since wheat returns per unit of land are low, much wheat acreage has been shifted to more profitable crops or returned to more environmentally friendly grasslands or forests. Labor is also moving out of agriculture as the large agricultural labor force shifts to nonagricultural employment where earnings are higher.

### ***Water Shortages Threaten Wheat Production***

Lack of irrigation water is one of the chief threats to China's wheat production (Lohmar et al.). Problems

<sup>2</sup> China National Grain and Oils Information Center, *China Grain Market Monthly Report*, No. 18, July 2001.

are particularly acute on the north China plain, which includes the important wheat-producing provinces of Henan, Shandong and Hebei, a region that has experienced drought in the last 2 years and rapidly falling groundwater tables. Wheat is especially vulnerable to water shortages because its main growing period is in the dry spring season.

Even in years of normal rainfall, northern China experiences water shortages. Rising industrial, household, and agricultural demand for water have outstripped water resources and infrastructure for delivering irrigation water. Water management institutions are geared toward exploiting China's water resources for agricultural and industrial development rather than managing them in a sustainable way. Many rivers, streams, and irrigation networks in the north China plain are now dry for much of the year. As surface water deliveries have grown less reliable, irrigation has increasingly relied on groundwater. Over 50 percent of irrigation water in Hebei and over 40 percent in Shandong is from groundwater.

In 1998, China responded to the impending water resource crisis by revamping the 1988 Water Law to emphasize water-saving practices, unify water management institutions, and invest in more efficient water-delivery infrastructure (Lohmar et al.). It is too early to measure the effectiveness of the new law, but if it fails to avert a water crisis, wheat production may be seriously curtailed. Wheat is heavily reliant on irrigation. The high-yielding varieties developed by breeders are often particularly dependent on irrigation, so their adoption will depend on reliable water deliveries. Wheat also provides farmers with lower returns than many other crops. Thus, if water becomes more scarce or costly, farmers will likely use it to irrigate fruits, vegetables, and other crops that bring higher returns.

### ***Research and Extension Investment Critical***

Research and development have played a key role in raising productivity of wheat inputs, and that role must continue in the future. In the 1960s, China imported dwarf rust-resistant and semi-dwarf wheat varieties from the international agricultural research system and from these seeds developed other Chinese varieties. Today, nearly all of China's wheat acreage is sown to either high-yielding or high-quality wheat varieties.

Investment in domestic seed research institutions is necessary to achieve further growth in wheat produc-

tion, but such investment has proven difficult in the past. China's ninth Five-Year Plan (1996-2000) set a goal of increasing agricultural research expenditures to 29 percent of total government research expenditures, but agriculture's share of government research remained at only 13-14 percent throughout the 1990s. Measures of agricultural research intensity declined in the 1990s and are below international standards established by the United Nations Food and Agriculture Organization (Nyberg and Rozelle). Increasing public investment in research to levels that match those of other agricultural nations will be a good start, but this alone will not be sufficient to raise wheat productivity.

Public investment in new wheat varieties could be supplemented by investments by nongovernmental organizations (NGO) and the private sector. However, international NGOs cannot make up entirely for lagging public investment because they do not focus on developing seeds for specific microenvironments. International NGOs develop plants with favorable traits that local public research institutes must adapt to local conditions.

Multinational seed companies have made substantial contributions to productivity of rice and other crops in many developing countries, but the role of such companies has been limited in China. Currently, only two multinational seed companies sell small amounts of field crop seed in China and only a few foreign companies conduct in-country research (Nyberg and Rozelle). Much of that research is for promotional purposes, rather than development of new varieties.

Poor enforcement of intellectual property rights is the primary impediment to seed development by foreign enterprises in China. China has extended property right protection to plant breeders only since 1997. Even though the legal framework is in place, enforcement remains insufficient. Barriers to entry for foreign seed companies, including government-sanctioned monopolies in some agricultural input industries and prohibitions on majority foreign ownership in joint ventures, discourage seed companies from entering China's potentially large seed market.

China's agricultural extension system must be upgraded to ensure that new technologies are actually used by farmers. In a recent survey by the Center for Chinese Agricultural Policy, more than 70 percent of village extension personnel reported that the frequency, scope, and coverage of their services fell in the 1990s and that

large numbers of village extension offices had closed over the decade. Fiscal constraints have induced local authorities to allow, and sometimes encourage, extension agents to supplement their incomes through engaging in work-related businesses, primarily selling agricultural inputs, such as pesticides, seeds, and fertilizer. While this practice has kept many village extension offices open, it can lead to conflicts of interest, where extension agents recommending seeds or other inputs are motivated by personal gain rather than the farmers' interests.

### ***WTO Accession Will Boost Wheat Imports***

China's wheat sector could be significantly affected by the country's accession to the WTO (see "China's WTO Accession Would Boost U.S. Ag. Exports and Farm Income" *Agricultural Outlook*, March 2000). China will implement a tariff-rate quota (TRQ) for wheat that will begin at 8.4 million tons in 2002 and rise to 9.6 million tons by 2004. If the wheat TRQs are filled, imports would rise to levels comparable to those of the early 1990s, substantially higher than the 2-4 million ton imports projected without WTO accession. China agreed to expand the role of nonstate trading enterprises in international trade after WTO accession, but state-trading enterprises will still control 90 percent of the wheat TRQ. China has also committed to a more transparent decision process for allocation of import quotas and science-based phytosanitary standards that are expected to reduce nontariff barriers to wheat.

Wheat has been viewed as a strategic commodity central to China's food security policy so the government is reluctant to relinquish control of the wheat economy to the free market. China's ability to maintain its grain self-sufficiency policies will be the "wild card" in its long-term wheat outlook. Some economists within China have called for loosening the grain self-sufficiency policies in favor of allowing markets to guide agriculture into production that makes more efficient use of China's resource endowment. China's government has indicated that modest grain imports are acceptable, but China's leadership may become uncomfortable if imports rise too high. In the past, China has used marketing and production policies to maintain self-sufficiency in grain, but it is not clear what policy tools will be permissible under WTO rules.

### ***Grain Bureaus Reduce Surpluses***

The Chinese government is trying to reduce its grain reserves to make room for imports expected after WTO accession. China will not be required to fill its TRQ for wheat after joining the WTO, but imports are expected to rise when the TRQs are in place, although not necessarily to the full 8.4 million tons set for 2002. Reportedly, the country's grain bureau would like to reduce wheat stocks to a minimal level to have more flexibility if imports do rise. During 2000 and 2001, grain bureaus held a series of auctions to sell off old wheat, much of it imported in 1996 or earlier. Since bidding prices were well below original purchase prices, grain bureaus experienced losses from the transactions that may be compensated by government subsidies. For the months of February and March 2001, the government announced a sale of 720,000 tons. The auctions could continue for the rest of the marketing year before China's accession to WTO.

Among the reforms China is implementing in anticipation of joining the WTO is a streamlining of the grain procurement and distribution system. In April 2000, the once-powerful State Administration of Grain Reserve, which controlled food rationing until its phase-out in the early 1990s, was reorganized into two separate entities to separate policy functions from commercial grain operations. The State Grain Bureau is a policy-oriented decision-making agency that will manage strategic grain reserves and implement other policy actions to address China's food security concerns. The China Grain Reserve Management Corporation will conduct grain trade business with the intent that it will eventually operate like a commercial trading company.

### ***Lengthy Decision Process for Imports May Grow Longer After WTO Entry***

Bureaucratic inertia slows the decision-making process for approving and executing wheat import sales in China. The process is lengthy, involving much paperwork and several layers of bureaucracy. Wheat has been the most tightly controlled agricultural trade item in China because of its strategic importance to food security. Except for small purchases, the State Council makes import decisions, and subordinating agencies operate under the scrutiny of supervising agencies.

This system may explain why China's wheat import purchases are characterized by a long lag time and have been sometimes unexpected, such as occurred in the mid-1990s. The institutional wheat import process can be depicted in the following four steps.

1. The State Council makes an import decision based on information received from various channels.
2. Based on the State Council's decision, the State Planning and Development Commission issues specific volume, varieties, and quality characteristics of foreign wheat to be purchased to other trade agencies, including the State Commission of Economics and Trade.
3. The Ministry of Foreign Trade authorizes the state trading company, COFCO, to source materials, negotiate prices, sign contracts, issue a letter of credit, and deliver foreign wheat to specific ports in China.
4. Upon the arrival of foreign wheat, COFCO turns over the ownership and grain-handling rights to the domestic grain bureau system, which then takes over receiving, warehousing, distributing, and managing of the imported wheat.

COFCO is a state-run enterprise that serves as a purchasing agent for domestic grain bureaus. However, when ownership of wheat imports is transferred from COFCO to the grain bureau system, COFCO must be paid by the state at fixed domestic prices. For example, when the world price is lower than the domestic market price, COFCO cannot sell wheat it has imported at a price that would undercut prevailing prices on the domestic market. The state holds ultimate responsibility for the final adjustment of financial losses or gains to both COFCO and the grain bureaus. The state subsidizes losses and takes in financial gains. If the grain bureau system finds that quality and quantity of the imported wheat differ from specified contract details, it can provide evidence to COFCO and ask for compensation.

Once China joins the WTO, the bureaucratic policy process could be exacerbated. China has agreed to implement TRQs for wheat, 10 percent of which will be allocated to private trading entities. The State Planning and Development Commission recommends

quota amounts, which are then approved by the State Council. Once the level has been set, the Ministry of Foreign Trade and Economic Cooperation will grant licenses to import specific quantities to specific companies, including COFCO and private business entities. The added layers of government involvement could imply an even longer lag time for purchases, more internal conflicts, unnecessary complications, and missed market opportunities.

The United States faces fierce competition from Australia and Canada for the China wheat import market. In the 1990s, Canada had the largest share of China's market; the U.S. market share averaged about 30 percent.

### ***Agreement on TCK Phytosanitary Standard: Implementation Ongoing***

Beginning in 1973, China banned imports of wheat and barley shipped from ports in the U.S. Pacific Northwest. Chinese authorities required that shipments be completely free of dwarf bunt smut, a minor plant disease caused by the pathogen *Tilletia Controversa Kuhn* (TCK), commonly referred to as TCK smut.

As part of the U.S.-China Agricultural Cooperation Agreement signed in 1999, China agreed to lift the longstanding phytosanitary ban on U.S. wheat from the Pacific Northwest. Previously, China had refused to accept wheat shipments with any trace of TCK spores. In the 1999 agreement, China agreed that U.S. wheat from any State or U.S. port would be accepted at any Chinese port, as long as the shipment was found to be below a tolerance level of 30,000 TCK spores per 50-gram sample.

Since the 1999 agreement was implemented in 2000, more than a dozen wheat shipments have been tested by the Federal Grain Inspection Service for export to China, and all were found to be within the TCK smut tolerance level. The TCK issue has not disappeared, however. Chinese customs officials continued to quarantine or demand treatment of wheat and barley shipments. In response to concerns raised by U.S. grain industry interests, Chinese officials reiterated China's determination to abide by the agreement.

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# Tradeoffs Between Quantity and Quality of China's Rice

Hsin-Hui Hsu and Guicai Liu<sup>1</sup>

**Highlights:** Although rice sown area in China has declined to 28.2 million hectares in 2001/02, rice exports are expected to reach 2 million tons. China eliminated procurement prices for early rice in southern provinces effective 2000. Per capita consumption of rice continues to decline with income growth, especially in the eastern coastal cities. Consumers are becoming more aware of quality differences among varieties and prefer japonica rice.

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Starting with the 2000 rice crop, China's government eliminated its price support program for early season rice, which mainly consists of low-quality *indica* rice grown south of the Yangtze River.<sup>2</sup> Total rice production is estimated to have decreased by about 5.3 percent in 2000/01 because of abolished official procurement prices and drought conditions in northern China. Total sown area of early rice is estimated to have declined 10 percent in 2000/01 compared with 1999/00. Due to the impact of previous grain-support policy changes, early rice area in 2001/02 is expected to drop again to an estimated 6.1 million hectares, down 10 percent from 2000/01.<sup>3</sup>

Paddy rice output for 2001/02 is forecast at 181 million tons, slightly lower than 2000/01 crops (table F-1). Single-crop midseason rice, which accounted for more than 55 percent of China's total rice production, has been decreased from an estimated 109 million tons (rough basis) in 2000/01 to 103 million tons in 2001/02. The estimated ending stocks stay high at 84.6 million tons, milled basis. To reduce costs associated

with its onerous rice inventory, China exported an estimated 1.8 million tons of milled rice to neighboring countries in 2000/01. Hence, China remains one of the largest rice exporters behind Thailand (6.7 million tons), Vietnam (4 million tons), and the United States (2.6 million tons).

## *Phasing Out Low-Quality Early Rice by Implementing New Grain Quality Standards*

In the 1990s, early rice (mostly *indica*) accounted for 25 percent of total rice sown area, or about 10 percent of China's annual total grain production of nearly 500 million tons. Early *indica* rice is not favored by Chinese consumers because of its mushy taste and the inability of its grains to stick together when lifted by chopsticks. Nevertheless, farmers have to produce *indica* rice to meet government annual grain production targets. Farmers usually put the rice in storage if alternative starchy food is available. After the grain has been stored for several years, its quality deteriorates to the point where it is unfit for human consumption, and it is then sold to local feed mills for animal feed.

Until 1999, the Chinese government supported rice prices and made little distinction between *indica* and *japonica* varieties. Farmers were given no incentives to correspond with the market, where low-quality early *indica* rice commands a lower retail price. As a result, *indica* rice inventories accumulated, becoming a financial burden for farmers and government. Because the government eliminated procurement prices in southern

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<sup>2</sup> At the same time, the Chinese government also eliminated support prices for low-quality spring wheat in northeastern provinces and winter wheat in southern provinces.

<sup>3</sup> China's National Grain and Oils Information Center, Beijing, September 2001.

**Table F-1—China's rice production, trade, and stocks, crop year August-July**

Rice	1997/98	1998/99	1999/00	2000/01	2001/02
	<i>Million tons</i>				
Production (paddy)	200.7	198.7	198.5	187.9	181.0
Production (milled)	140.5	139.1	138.9	131.5	126.7
Imports (milled)	0.3	0.2	0.3	0.3	0.3
Exports (milled)	3.7	2.7	3.0	1.8	2.0
Stocks (milled)	93.0	96.0	98.5	94.2	84.6

Source: USDA forecasts as of October 12, 2001.

China's early rice areas effective for 2000 crops, the southern provinces of Hunan, Hubei, Anhui, and Jiangxi formed an interprovincial rice alliance (cartel) to maintain some protection prices for local producers.

Farmers now understand that quality products bring a premium price. However, "quality" in China is open to various interpretations, including sanitary standards, processing methods, nutritional value, and taste. The government released a new set of standards for so-called quality rice in 1999, but rice producers have tended to interpret the standards differently. Some producers thought that organic rice (i.e., "green food" in Chinese terminology) was quality rice. Others thought that processed black rice with a special flavor was a quality rice product. Some believed that quality could be achieved by adding vitamins and minerals to milled rice to enhance nutritional value, or by simply using advanced milling equipment.

China's government provides five standard grade levels for indica and japonica paddy rice (rough basis). Standard grades of indica rice have 50 percent whole kernel rice with milling rates ranging from 71 to 79 percent, while japonica rice has 60 percent whole kernel rice with milling rates ranging from 73 to 81 percent. In 2000, the government provided three new premium grade (high-quality) standards under which more scientific-based criteria must be met, including percentage of whiteheads, imperfect grains, three classes of flavor, and higher whole-kernel counts of 50 to 56 percent for indica rice, and 60 to 66 percent for japonica rice. To local officials, quality rice would come from certified breeding varieties grown in large fields with homogeneous output. Small-plot producers would not be able to meet this criterion if they did not act collectively at the village level to deliver a significant quantity with quality product characteristics of homogeneity. Local grain procurement stations provide a 10-percent price markup for quality rice if it meets certification requirements.

Beyond state or national standards on paddy rice, China has so-called industry standards that could be more pragmatically adopted for milled rice. The Ministry of Agriculture established the industry standards in 1986 for rice used for milling and final food preparations. Most of these standards, however, are outdated because newly developed grains and rice varieties have appeared since the standards were issued. Major mills are now promoting registered brand names as a signal of fine quality. Registered brands tend to be local products, and no dominant national brands have emerged. Brand names are not popular in China because consumers are not yet able to relate them to specific characteristics. Similarly, consumers are not confident that mills can source the same rice from specific producing areas and maintain consistent quality.

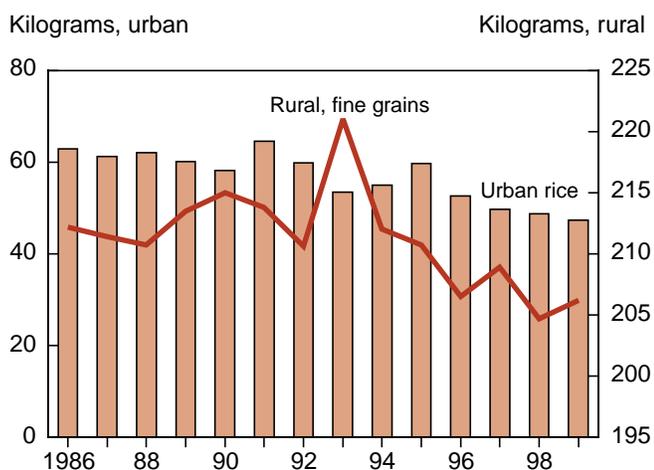
Per capita rice consumption is declining for both urban and rural residents (fig. F-1). Some researchers have identified rice as an inferior good in China—a good whose demand falls as consumer incomes rise. While the total quantity of rice may fall as consumer incomes rise, the demand for quality rice grows as consumers become wealthier, particularly from urban residents in coastal cities.

### ***Competing Vigorously Beyond Asian Markets***

Due to abundant supplies and the recovery of overseas markets from the Asian financial crisis, China exported nearly 3 million tons of rice in calendar year 2000 and was the world's third-largest rice exporter (table F-2). In calendar year 2000, China experienced growth in both rice exports (9 percent) and imports (41 percent), compared with 1999. Most of China's rice exports were indica varieties from the Yangtze River region, including Jiangxi, Anhui, Hunan, and Jiangsu provinces. Most japonica rice was exported from the northeastern provinces, including Liaoning,

Figure F-1

### Per capita purchases of rice for urban residents and fine grains for rural residents



Source: China's National Bureau of Statistics, urban and rural household surveys, various years.

Heilongjiang, and Jilin. In the northeastern provinces, a number of joint-venture farms with investors from Japan and Korea have been producing rice for the export markets.

China's rice exports have diversified in recent years. China has exported increasing quantities of rice to

countries outside of eastern Asia, including Cote d'Ivoire, Cuba, Russia, Iraq, and Guinea. In 1999, rice exports to neighboring Asian countries were 1.2 million tons, with Indonesia the biggest buyer at 734,000 tons. China also exported 161,000 tons of rice to Russia and 604,000 tons of rice to Middle Eastern and African countries. In 2000, Cote d'Ivoire imported 870,000 tons of rice and was China's largest rice export market.

Southern coastal provinces, particularly Guangdong and Hainan, are major rice importers because of their strategic locations and the convenience of transportation systems. Thailand has been the dominant supplier of rice, exporting 238,000 tons of quality fragrant jasmine rice to China in 2000 and accounting for over 99 percent of China's rice imports.

### China's WTO Accession Will Have Minor Impacts Domestically

Based on the terms of the U.S.-China bilateral agricultural agreement on accession to the World Trade Organization (WTO), China's WTO entry will have a minimal impact on its rice production. In fact, rice is the only agricultural commodity for which China could remain as a net exporter; China's rice exports

**Table F-2—China's rice exports and imports by country, calendar year, 1997-2000**

Country	1997	1998	1999	2000	4-year average	4-year shares
<b>Exports:</b>						
Philippines	184.4	1,374.7	180.6	64.4	451.0	17.5
Indonesia	9.8	1,362.6	734.2	541.9	662.1	25.6
North Korea	91.8	77.9	86.3	52.7	77.2	3.0
South Korea	13.9	74.6	115.8	131.0	83.9	3.2
Japan	36.3	81.2	75.6	66.4	64.9	2.5
Iraq	124.0	98.7	102.9	169.5	123.8	4.8
Cote d'Ivoire	100.0	179.9	421.1	869.6	392.7	15.2
Cuba	84.6	145.4	226.9	225.5	170.6	6.6
Others	294.3	350.4	759.9	827.0	557.9	21.6
<b>Total</b>	<b>939.3</b>	<b>3,745.4</b>	<b>2,703.2</b>	<b>2,948.1</b>	<b>2,584.0</b>	<b>100.0</b>
<b>Imports:</b>						
Thailand	323.2	242.5	167.6	238.0	242.8	99.4
United States	1.2	0.5	0.6	0.4	0.7	0.3
Myanmar	1.0	0.0	0.0	0.0	0.2	0.1
Others	0.8	0.8	0.1	0.2	0.4	0.2
<b>Total</b>	<b>326.2</b>	<b>243.8</b>	<b>168.3</b>	<b>238.6</b>	<b>244.2</b>	<b>100.0</b>

Source: China Customs statistics.

may even increase following WTO accession.<sup>4</sup> According to the agreement, China will implement a tariff-rate quota (TRQ) system with an annual import quota of 2.7 million tons of rice in the initial year that would gradually rise to 5.3 million tons over 9 years. The quota would be split equally between indica and japonica rice. For japonica rice, private rice traders (nonstate-owned business entities) will have a 50-percent share of the quota immediately upon accession. For indica rice, however, state trading enterprises will control 90 percent of the imports.

The TRQs do not represent minimum purchase commitments. If imports reached the full TRQ level, they would still be a small share of China's domestic rice market, where annual rice production ranges from 130 to 140 million tons annually (milled basis). Imports are likely to be premium grade quality rice from the United States, Thailand, Vietnam, India, and Brazil. The United States would have a competitive advantage in selling high-quality long- and medium-grain rice to China.

Although China's rice imports under the WTO agreement could have minimal impact on the Chinese market because of its huge consumption base, the impact on the world rice market would be more substantial. The world annual export volume of rice averages 15 million tons, which is only about 8 percent of China's annual consumption. In this thin market, minor changes in the China market can have important repercussions. China's future rice imports could account for 20-30 percent of world trade and

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<sup>4</sup> Using the USDA 1999 baseline, ERS estimates that China's net annual average rice exports will increase by \$15 million between 2000 and 2009 due to the country's accession to WTO.

could raise world market prices, especially for premium quality rice.

On the other hand, China could become a major rice exporter as domestic surplus stocks continue to rise and if world prices are higher than domestic prices. For example, China's rice exports accounted for 13 percent of the minimum commitment of rice imports for Japan and 99 percent of the minimum commitments for South Korea in 2000. China's chief competitors for these two markets are the United States and Australia.

China's competitiveness position in the world rice market could be weakened in the long run if rice producers can not overcome institutional and trade barriers. For example, the average rice farmer in China has less than 2 mu (i.e., 0.3 acre) of farmland and tends to keep 70 percent of rice output for on-farm uses. The remaining 30 percent of rice is eventually commercialized through state-owned grain companies or local private grain merchants. China has not been able to reach scale economies for rice production or enhanced efficiency of post-harvest marketing operations.

Another institutional barrier is the state-owned grain companies and enterprises. State grain enterprises have seen the growing price gaps between premium and lower grade rice and would use their monopolistic market power to block private merchants from entering the grain market. State grain enterprises may be inefficient in administering grain procurement and redistribution, but they have more operating capital than private merchants to buy and to store. Also, grain enterprises have the right to sign production and/or marketing contracts with local farmers for high-quality rice at any time. This situation has reduced, if not totally eliminated, opportunities for private traders.

# Policy Changes Continue To Affect China's Oilseeds Trade Mix

Hsin-Hui Hsu

**Highlights:** China's imports of soybeans reached an estimated 13.2 million tons in 2000/01, its highest-ever level. Soybean oil and soymeal imports fell sharply due to a value-added tax on soymeal imports intended to protect domestic crushing margins. Government support for soybeans is less than support for coarse grains, especially in the northeastern region of China where competing cropping patterns are important. Rising urban incomes are stimulating demand for better grade edible oils. China's accession to the World Trade Organization could favor imports of oils over imports of soybeans and soymeal.

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China's erratic shifts in domestic agricultural policy can create an unstable market environment. Policy measures intended to affect one commodity can often spill over into related markets. The lifting of China's value-added tax (VAT) on soymeal imports and the subsequent restoration of the tax during the 1990s exemplifies the country's tendency to shift policies.

In making policy decisions, China distinguishes between soybeans and soybean products. Soybeans and soybean oil are food items used for making tofu (doufu) and cooking oil, while soymeal is an ingredient used for making processed compound feeds. In 1995, the government lifted the VAT on soymeal to encourage growth in the livestock industry and raise per capita meat consumption. This policy led to an influx of 3.6 million tons of soymeal imports in 1996/97 and another 4.2 million tons in 1997/98. Abundant supplies of soymeal hurt soybean prices, reduced domestic crushing margins, and discouraged producers from planting soybeans. As domestic crush fell and demand for oils rose, smuggling of edible oils ensued, peaking in summer 1998. Unofficial imports of vegetable oils were estimated at 1.65 million tons in 1998.<sup>1</sup> Lifting the VAT from soymeal imports created

imbalances in the soybean complex and distorted domestic corn/soybean cropping patterns.

To correct these imbalances, China re-imposed the 13-percent VAT on all imported soymeal in July 1999. Restoration of the VAT on soymeal imports favored imports of unprocessed soybeans as opposed to soybean products.<sup>2</sup> Consequently, soymeal imports dropped from 4.2 million tons in 1997/98 to 0.1 million tons in 2000/01. Soybean oil imports also declined from 1.65 million tons in 1997/98 to 0.08 million tons in 2000/01. Soybean imports soared from 3.8 million tons in 1998/99 to 10.1 million tons in 1999/00 (plus another 3.7 million tons of rapeseed that year) and are projected to rise to 14 million tons in 2001/02 (table G-1). The rising use of raw oilseeds improved domestic crushing capacity, increased employment, and diminished smuggling of edible oils. China's reversal of the soymeal VAT policy exemplifies how the country's competing policy objectives (e.g., favoring certain industries, engineering food consumption patterns, and solving unemployment problems) can lead to instability that reverberates in markets throughout the world.

<sup>1</sup> The difference between imports as reported by China's Custom's data and total soybean oil exports to China reported by the United States, Brazil, Argentina, and European Union.

<sup>2</sup> The VAT plays an important role in keeping China's domestic soybeans competitive with foreign imports. While the VAT is collected on imports at the border, domestic producers either fail to pay the VAT or absorb the tax without passing it on to their customers and then receive rebates to defray losses.

**Table G-1—China's soybean, soymeal, and soybean oil indicators, 1997/98-2001/02**

Product	1997/98	1998/99	1999/00	2000/01	2001/02
	<i>Million tons</i>				
Soybeans:					
Production	14.7	15.2	14.3	15.4	15.0
Crushing	8.5	12.6	15.1	18.7	21.6
Imports	2.9	3.9	10.1	13.2	14.0
Exports	0.2	0.2	0.2	0.2	0.2
Soybean meal:					
Production	6.7	10.0	12.0	14.8	17.2
Imports	4.2	1.4	0.6	0.1	0.3
Exports	0.0	0.0	0.0	0.1	0.1
Soybean oil:					
Production	1.4	2.1	2.5	3.1	3.6
Imports	1.7	1.0	0.6	0.1	0.2
Exports	0.1	0.1	0.1	0.1	0.1

Source: U.S. Department of Agriculture, *World Agricultural Supply and Demand Estimates*, October 12, 2001.

In May 2000, the VAT issue resurfaced. China's State Administration of Taxation announced that the VAT should be removed from the price list for domestic protein meal, which was defined and used as a feed ingredient, effective June 1, 2000. The announcement confused many agribusiness firms as well as a number of government agencies in China, including the Ministry of Agriculture, the Ministry of Finance, and the State Administration of Grain Reserve. The on-again, off-again nature of the soybean VAT temporarily threw the soy complex trade into chaos. Eventually, the State Council blocked the decision to protect the domestic crushing industry, preserve government revenue, and maintain consistency with the previous policy of limiting soybean imports.

China's decision-makers continue to struggle to find policies that achieve their intended goals without disrupting other sectors. In making soy-related policy, decision-makers must strike a balance among crop production, animal feeding, oil crushing, and refining subsectors. Thus far, policy-makers have had limited success. Urban and rural interests must also be balanced. Recent policies intended to benefit urban residents with cheap meat and oil products worked against the interests of farmers and caused great disruptions in agricultural markets.

### ***Favorable Treatment of Corn Erodes Soybean Production***

Domestic farm price policies that favor corn over soybeans have also affected China's soy complex in recent years. China's food security policy has empha-

sized production of corn and food grains, but not soybeans. As in the United States, corn is the chief competing crop for soybean planted area. Both crops are grown primarily in China's northern provinces. While corn production is still carefully managed, China has been reducing the role of government procurement of soybeans for years. After many rounds of policy reforms, Heilongjiang, the most important soybean-producing province in China, was the only province that still maintained a procurement system that required a government procurement price. However, the latest report from China indicated that, effective in 2001, farmers in Heilongjiang will not receive a government-guaranteed procurement price for its soy crops. Corn growers in the province still receive a government procurement price.

The ratio of soybean-to-corn returns (measured by the ratio of government-set procurement prices/loan rates) is less favorable in China than in the United States (table G-2). Since 1994, China's soybean-corn price ratio has fallen from over 2.2 to 1.8. In the United States, the soybean-corn price ratio rose from 2.6 to 2.8 over the same period. Assuming that there were no offsetting trends in yields or production costs, this comparison suggests that the attractiveness of soybeans relative to corn has fallen for producers in China, while it has risen for producers in the United States. In recent years, China's soy imports have risen while China's corn supplies have expanded (see "Subsidized Corn Exports Help Prices Rebound" in this report). Imported soybeans accounted for 53 percent of total crushing in 2000/01. This degree of reliance on imports alarmed

**Table G-2—A comparison of price support programs between China and the United States**

	China's procurement prices			U.S. loan rates		
	Soybeans	Corn	Ratio	Soybeans	Corn	Ratio
	<i>Yuan/kilogram</i>			<i>Dollar/bushel</i>		
1990	0.83	0.38	2.18	4.50	1.57	2.87
1991	0.88	0.38	2.32	5.02	1.62	3.10
1992	0.91	0.42	2.17	5.02	1.72	2.92
1993	1.04	0.46	2.26	5.02	1.72	2.92
1994	1.54	0.69	2.23	4.92	1.89	2.60
1995	1.81	0.86	2.10	4.92	1.89	2.60
1996	1.95	1.06	1.84	4.97	1.89	2.63
1997	2.28	1.23	1.85	5.26	1.89	2.78
1998	2.23	1.23	1.81	5.26	1.89	2.78
1999	2.10	1.14	1.84	5.26	1.89	2.78
2000	na	na	na	5.26	1.89	2.78
2001	na	na	na	5.26	1.89	2.78

Note: na = not applicable.

Sources: China's Ministry of Agriculture and U.S. Department of Agriculture.

government decision-makers and could trigger another round of policy changes.

### ***Crushing Margin Is Getting Lower***

As soybean processing margins grew in the mid-1990s, China began promoting domestic processing. Total crushing capacity (soy only), which expanded by one-fourth in the past 2-3 years, now exceeds 23 million tons per year and is still growing. Most new crushing plants are located in southern China, where commercialized hog and poultry operations are common. New crushing facilities with impressive daily processing capacities of 3,000 tons have also been established in coastal areas. The annual crushing utilization rate was estimated at 70 percent in 2000. Most new plants are joint ventures that operate at full capacity so as to repay construction loans and debts as early as possible. New plants are more efficient, tend to be located near high-demand, wealthy southern cities, and are more likely to use imported soybeans. The rising capacity from new plants has reduced crushing margins, put pressure on operating capital, and pushed old and inefficient plants out of production (fig. G-1).

In recent months, weakening demand for end products has also reduced crushing margins, especially in northern and northeastern China. Soymeal prices are stagnant because the expansion of China's hog and poultry industry has slowed. Meanwhile, substitution between soybean oil and competing edible vegetable

oils, and between crude and refined oils, has prevented soybean oil prices from rising excessively.

Production in the southeastern province Guangdong, whose facilities have a 7,000-ton daily crushing capacity, is still rising to supply high-protein feed to that province's growing poultry industry. Because of Guangdong's coastal location, its crushers most likely use imported oilseeds, both soybeans and rapeseed. The local crushing margin is relatively high because the local soymeal price is higher than prices in other areas of China. The poor transportation infrastructure within China renders domestic shipments of soybeans and soymeal more costly to Guangdong crushers than imports.

### ***Urban Consumption of Quality Salad Oil Increasing***

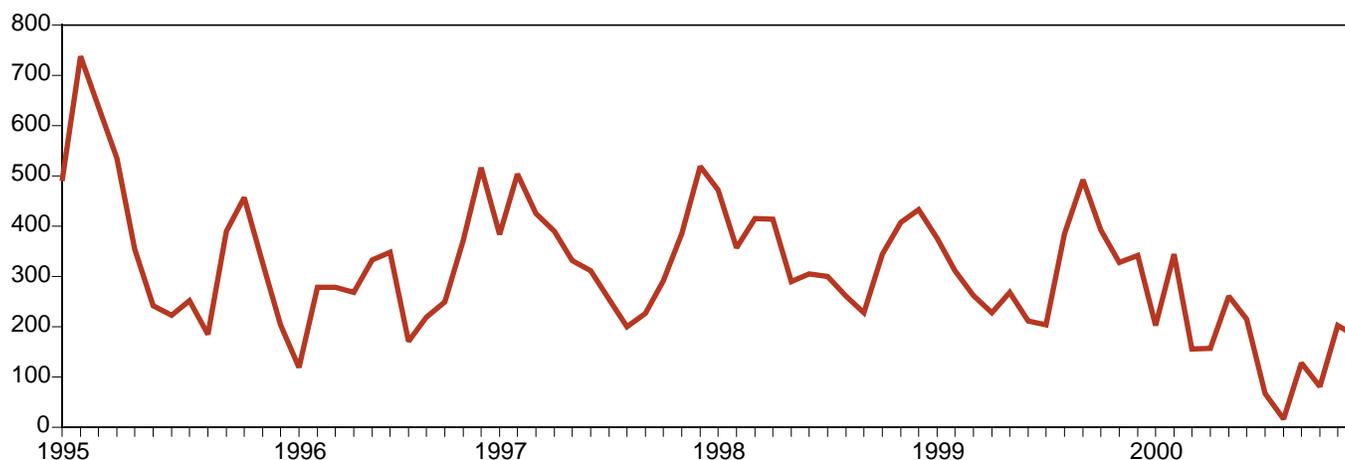
Chinese consumers have traditionally used animal fats and vegetable oils that were available in their local areas. For example, consumers in northeastern China used soybean oil, consumers in the Yangtze River area used rapeseed oil, and consumers in southern China, such as Guangdong province, used peanut oil. Now, China is the world's second-largest importer of palm oil, used mainly in processing instant noodles.

Per capita consumption of edible oils measured by purchased amount from China's household survey, has increased for both urban and rural residents (fig. G-2). While urban residents are eating more meat products

Figure G-1

**China's crushing margin for soybeans, monthly, 1995-2000**

Yuan/ton



Source: China's National Grains and Oils Information Center.

and less animal fats, rural residents are consuming more edible oils. Although the income gap between urban and rural residents is widening, the gap in per capita consumption of vegetable oils between rural and urban populations is steady at about 3 kilograms, or about 35 percent of the consumption levels between the two groups, since the mid-1980s. With a growing population and an increased need for edible oils, China seeks to increase production of all kinds of oils and minor oilseeds, including rapeseed (canola-type), peanut, sunflower, sesame, and cottonseed.

Regional diversity in consumption for urban residents is gradually disappearing, due to improved quality of cooking oils. Refined salad oils are replacing (or have replaced) the most popular crude #2 oils in urban areas. Although soybean oil will account for the largest share of oil consumption, substitution among minor oils will increase. Price differences between soybean oils with respect to rapeseed, sunflower seed, and peanut oils will narrow.

***Low Tariffs for Soybeans and Soymeal, Tariff-Rate Quota Set for Soybean Oil***

China's grain policy now focuses on maintaining self-sufficiency in corn and food grains, while soybean policies are more liberalized. This liberalization is reflected in the relatively low tariff rate of 3 percent currently in place for soybeans. Soymeal imports are subject to a 5-percent tariff and a 13-percent VAT. The 1999 bilateral trade agreement between the United States and China contains special terms for soybean oil

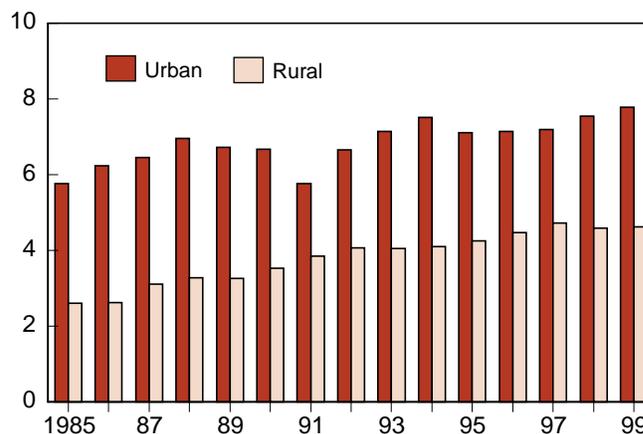
but excludes specific terms for soybeans and soymeal (see "U.S.-China Bilateral WTO Agreement and Beyond" in this report). Quotas on soybeans and soymeal were not in place prior to the bilateral agreement, and none were established in the agreement.

The bilateral agreement established a tariff-rate quota (TRQ) of 2.3 million tons for soybean oil in 2002, which rises to 3.26 million tons in 2005. Within-quota imports would be subject to a low duty of 9 percent, while above-quota imports would be assessed a prohibitively high duty of 48 percent in 2002, falling to 9 percent in 2006. Private trading companies would

Figure G-2

**Per capita consumption of vegetable oils, urban versus rural, in China, 1985-99**

Kilograms



Source: National Bureau of Statistics, China.

be allocated 66 percent of the TRQ in 2002, rising to 90 percent in 2005. The TRQ system for soybean oil would be eliminated by 2006 and converted to a bound 9-percent tariff rate.

The bilateral agreement between the United States and China contained no provisions for rapeseed or other minor oilseeds. However, Canada has negotiated similar terms for canola oils, including a TRQ that will start at 600,000 tons upon China's accession to the World Trade Organization (WTO) and rise to 1.13 million tons over 5 years.<sup>3</sup> Canola oil would face the same tariff level at 9 percent to be competitive with alternative edible oils. No TRQ would apply to canola seed. Also, China has a bilateral agreement with Malaysia to eliminate China's palm oil quota within 6 years after WTO accession. The palm oil quota was set at 1.5 million tons in the first year. The agreement also allows nonstate trading enterprises to handle 50 percent of palm oil imports in the first year and 90 percent by the fifth year.

### ***China's Imports of Edible Oils Should Rise Under WTO***

USDA's Economic Research Service analysis indicates that China's total imports of soybean, soybean oil, and soymeal will rise at an average of 19 percent (soybeans), 78 percent (soybean oil), and 30 percent (soymeal) over the baseline levels between 2001 and 2010, assuming China's accession to the WTO occurs in 2001 (table G-3) (see box). China is expected to import growing amounts of within-quota soybean oil, but less than the full amount of 3.26 million tons by 2005 as agreed upon in the bilateral agreement. Potential imports of soybean oil are expected to be partly offset by increasing imports of soybeans as the over-quota duty declines. Imports of soybeans will grow even more following elimination of the soybean oil TRQ system after 2005.

The simulation results also show some increases of 2.6 percent (soybeans), 3.9 percent (soybean oil), and 1 percent (soymeal) in world *real* prices over the projection period. World suppliers will benefit not only from higher volume shipped to China but also from slightly higher prices for soybeans and soybean products.

<sup>3</sup> News release from the Department of Foreign Affairs and International Trade, Canada, Website, <http://www.agr.ca/itpd-dpci/cr4.html>, November 26, 1999.

## **ERS simulation of China's accession to WTO**

ERS analyzed the likely changes in global oilseed trade arising from China's accession to the WTO. The analysis used the global Country Linked System (CLS) of models, a quantitative analytical tool used to generate the USDA annual baseline. The system contains 42 foreign country and regional models and interacts with the Food and Agricultural Policy Simulation model of U.S. agriculture. The CLS contains about 18,000 equations per year of projections on production, consumption, imports, and exports in the model with endogenized calculation of world prices.

The 2001 baseline projections were released at USDA's Agricultural Outlook Forum in February 2001. The longrun baseline projections through 2010 were built on specific assumptions regarding macroeconomic conditions, policy, weather, and existing patterns of trade with no external shocks (including WTO accession by China). ERS projected trade levels under China's WTO accession and compared the projections with baseline projections to estimate the likely impacts of China's accession to the WTO.

In addition to the oilseed complex, the analysis included corn, wheat, cotton, rice, and other agricultural commodities. ERS assumed that China would continue to assess the VAT on oils and meal imports and clamp down on smuggling of edible oils to support domestic crushing facilities in the short term. This policy is expected to have only a marginal effect on China's oilseed and products trade, as inefficiencies in China's domestic crushing sector are likely to limit its long-term competitiveness. Over the baseline projection period, ERS assumed that China's economy will continue to grow rapidly at 6.5-7.5 percent annually, with a projected population growth of 0.7-0.8 percent per year.

The increase of China's soybean and soybean product imports could be a direct effect of lower area sown to soybeans for the simulation period. China would grow less soybeans, rapeseed, wheat, corn, and cotton, but more rice, when government protection prices face challenges from overseas producers. Estimated soybean sown area would decline by an average of 3.9 percent between 2001 and 2010 while domestic

**Table G-3—China’s accession to WTO would boost its imports of soybeans and bean products from projected USDA 2001 baseline levels**

Crop years	Soybean		Soybean oil		Soymeal	
	Baseline <sup>1</sup>	WTO changes	Baseline <sup>1</sup>	WTO changes	Baseline <sup>1</sup>	WTO changes
	<i>Million tons</i>	<i>Percent</i>	<i>Million tons</i>	<i>Percent</i>	<i>Million tons</i>	<i>Percent</i>
1997/98	2.9		1.7		4.2	
1998/99	3.9		1.0		1.4	
1999/00	10.1		0.6		0.6	
2000/01	13.2		0.1		0.1	
2001/02	14.0		0.3		0.2	
2002/03		12.56		77.33		28.16
2003/04		14.40		77.46		29.54
2004/05		15.74		77.35		29.90
2005/06		17.54		77.36		29.17
2006/07		19.75		77.56		29.26
2007/08		22.70		78.53		29.52
2008/09		24.30		78.79		30.80
2009/10		25.91		79.11		31.71
2010/11		27.59		79.15		33.24

Notes: Baseline estimates were combined from two sources: Annual estimates (from 1997/98 to 2001/02) published in *WASDE*, October 2001, and long-term projection numbers from *USDA Agricultural Baseline Projections to 2010*, February 2001.

Source: Economic Research Service, USDA.

crushing would decrease by an average of 4.5 percent. For the same simulation period, rapeseed areas would decrease by an average of 5.5 percent. However, the simulation also showed that combined total output of pork, poultry meat, beef, and veal will grow at an average annual rate of 3.3 percent and push up demand for more protein meals, which could imply more imports of soymeal. The results indicate that China’s consumers will enjoy lower food grain (wheat and rice) prices after the country’s WTO accession. However, China’s livestock producers will have to adjust to higher price levels of protein meals.

Palm and rapeseed oil are potential competing products with soybean oil. But, continued strong demand for crude and refined soybean oil for home consumption and for special use in processed food items could limit the potential substitution for soybean oil imports.

China will be a promising market for edible oils due to the increased import quotas and reduced tariffs that follow its accession to the WTO. However, since oil accounts for only about 18 percent of processed soybean products, the impact of liberalizing the soybean oil market on soybean prices and demand could be small. For example, in 1994, soybean oil prices increased sharply due to decreased rapeseed output, but this increase had no impact on soybean

prices. In 1999, demand for soybeans suddenly increased and soybean prices rose, yet at the same time prices for soybean oil decreased.

The ERS analysis does not allocate trade gains among major suppliers. Table G-4 shows market shares for individual countries for major oilseeds and products. While the United States, Brazil, and Argentina have been strong as suppliers to China for soybeans, soybean oil, and soymeal, India has emerged as a strong competitor in soymeal. The combined total of rapeseed (and canola) from Canada and Australia accounted for an average of 70 percent of China’s rapeseed imports. The European Union’s share of rapeseed oil has decreased from a peak of 79 percent in 1997 to 2.5 percent in 2000. Malaysia and Indonesia are the dominant palm oil suppliers to China.

### Reference

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U.S. Department of Agriculture, Office of Chief Economist. *USDA Agricultural Baseline Projections to 2010*, February 2001, p. 140.

**Table G-4—China's imports of major oilseeds and products, 1996-2000**

Markets	1996	1997	1998	1999	2000	Average	Share
	-----1,000 tons-----						<i>Percent</i>
<b>Soybeans:</b>							
United States	859.7	2,285.6	1,752.4	2,444.7	5,413.8	2,551.2	58.4
Brazil	52.8	439.9	941.2	860.1	2,119.6	882.7	20.2
Argentina	118.0	0.0	391.1	964.0	2,784.3	851.5	19.5
Canada	10.2	11.2	12.8	38.4	54.5	25.4	0.6
Others	66.9	54.9	98.8	8.1	44.0	54.6	1.2
Total	1,107.5	2,791.5	3,196.3	4,315.4	10,416.2	4,365.4	100.0
<b>Soybean oil:</b>							
United States	51.3	288.8	395.3	290.8	62.3	217.7	24.6
Brazil	955.7	638.6	157.7	132.5	72.9	391.5	44.2
Argentina	162.2	202.3	202.3	361.4	137.5	213.1	24.1
Canada	0.0	0.0	1.8	1.0	0.0	0.6	0.1
Others	125.5	63.6	71.7	18.1	34.9	62.8	7.1
Total	1,294.7	1,193.3	828.8	803.7	307.6	885.6	100.0
<b>Soymeal:</b>							
United States	105.1	386.1	858.6	84.6	0.3	286.9	14.1
Brazil	399.1	1,432.3	1,144.2	77.5	87.0	628.0	30.9
Argentina	759.5	1,049.2	832.3	224.6	316.3	636.4	31.3
India	578.8	548.7	890.9	159.8	96.8	455.0	22.4
Others	33.9	53.2	7.3	25.5	4.9	25.0	1.2
Total	1,876.5	3,469.5	3,733.3	571.8	505.3	2,031.3	100.0
<b>Palm oil:</b>							
Malaysia	773.7	813.9	708.9	781.3	908.9	797.3	70.3
Indonesia	164.6	290.5	187.0	355.2	464.1	292.3	25.8
Singapore	5.3	14.0	2.6	22.5	8.6	10.6	0.9
Vietnam	52.6	20.4	26.0	29.3	8.4	27.3	2.4
Others	15.9	6.9	5.6	5.3	0.8	6.9	0.6
Total	1,012.2	1,145.7	929.9	1,193.5	1,390.7	1,134.4	100.0
<b>Rapeseeds:</b>							
Canada		0.0	929.0	916.7	1,255.9	775.4	44.3
Australia		42.7	90.5	502.5	1,148.0	445.9	25.5
France		12.0	232.8	395.6	270.7	227.8	13.0
Germany		0.0	133.1	324.1	197.1	163.6	9.3
United Kingdom		0.0	0.0	110.1	0.0	27.5	1.6
Poland		0.0	0.0	210.3	0.0	52.6	3.0
Others		0.6	1.0	136.0	97.2	58.7	3.4
Total		55.2	1,386.4	2,595.3	2,968.9	1,751.5	100.0
<b>Rapeseed oil:</b>							
Netherlands	54.5	79.9	99.7	21.0	1.8	51.4	23.5
Canada	55.1	23.9	42.8	12.7	70.5	41.0	18.7
Germany	121.3	195.9	85.1	11.8	0.1	82.8	37.8
United States	0.0	15.9	13.0	11.9	0.7	8.3	3.8
Vietnam	2.0	4.5	0.0	3.3	0.0	2.0	0.9
Malaysia	53.1	18.0	16.9	3.5	1.4	18.6	8.5
Singapore	2.6	4.2	5.8	3.1	0.0	3.1	1.4
Others	27.3	8.3	21.4	1.8	0.2	11.8	5.4
Total	316.0	350.5	284.6	69.2	74.7	219.0	100.0

Sources: China's Customs Service and National Grains and Oils Information Center.

# Livestock Production Competitive, But Exports Remain Small

Francis Tuan, Qingbo Cao, and Tingjun Peng

**Highlights:** China's livestock production has developed rapidly since it began using more manufactured feed in the 1980s. Meat output grew significantly over the past two decades, as did rural and urban per capita meat consumption. The decline in livestock prices that began in 1996 was halted in 2000. Some prices have rebounded. Although production of China's livestock products is quite competitive, exports of livestock products remain low because of disease and quality issues.

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China's livestock sector has changed significantly since the mid-1980s due to market liberalization as well as modernization and commercialization of livestock production. Increases in income and population in China have boosted demand for livestock products. The livestock sector's share of agricultural output nearly doubled, from 15 percent at the beginning of rural reforms in the 1970s to 29 percent in 1999. While indicators of the economic cost of livestock production suggest that China's livestock industry is quite competitive, large exports have yet to materialize.

## *Greater Use of Feed Grains*

Despite a long history of livestock-raising activities, China's livestock industry did not begin to develop rapidly until the mid-1980s. Even today, most meat is still produced with traditional "backyard" methods—that is, rural households raise animals on a small scale to supplement their farm income. However, households specializing in livestock-production activities as their principal occupation now account for an increasing share of production. These "specialized households" rely far less on homegrown grain and farm by-products and are more responsive to grain prices than traditional backyard operations.

As recently as the early 1980s, most of China's domestic animals, including hogs, cattle, goats, sheep, and chickens, were fed in the backyards of farm households. Hogs ran free or were kept in small,

partially roofed pigsties. Cattle, goats, and sheep were either fed in small pens or herded along the sides of roads and edges of fields, where they could eat weeds. Before the 1980s, cattle were raised primarily for plowing, and because manufactured fertilizer was scarce, manure was a valuable by-product of animal husbandry.

Depending on the type of animal, feed ingredients generally included low-quality grains, tubers, grain by-products, table scraps, brewery residues, green silage, melons, water plants, and other vegetation. Oilseed meals were not used extensively; rather, they served mainly as a fertilizer for crops. Large amounts of feed grains, together with soybean meal or rapeseed meal, were used as animal feed only later, and then introduced only gradually, beginning around the mid-1980s.

Pork production is the core of China's livestock industry. In 1999, pork contributed about 84 percent of China's red meat production and 67 percent of total meat output (see table H-2). At present, about 80 percent of China's pork output comes from backyard operations, 15 percent comes from specialized households (that are principally employed in hog raising), and 5 percent comes from large-scale commercial operations. In the mid-1980s, about 95 percent of hogs were raised by backyard enterprises. This structural change in hog production improved feed efficiency and increased output significantly (Fang et al.).

Improved feeding efficiency helped reduce seasonal variations in pork supplies, largely eliminating dependence on frozen meat during seasons when production was traditionally low. Improved feeding efficiency in livestock production over the past 10-15 years significantly shortened China's livestock production cycles. For example, hogs raised in southern China now require only 4 months to reach marketable weight (about 100 kg), compared with 7 months needed in the 1980s. Hogs raised in northern China now need about 6 months to reach slaughter weight, compared with 10 months needed in the 1980s. Today, meat quality and feed efficiency are increasingly important goals. These goals will become even more critical as China prepares to join the WTO.

### Changing Production Structure

In the early 1980s, pork contributed over 90 percent of China's total meat output. Pork's share fell to around 80 percent in 1990 and only 67 percent in 1999 (fig. H-1). Other meats, including poultry, have grown significantly as a share of China's total meat output in the same period. Poultry production, with its high feed-conversion ratio, has made more efficient use of China's feed supply. Poultry's share of China's total meat production grew from 11 percent in 1990 to nearly 19 percent in 1999.

During the 1990s, livestock production became more geographically concentrated in major corn-producing

provinces of northeastern China (Jilin, Liaoning, and Heilongjiang) and the north China plain (Hebei, Henan, Shandong, and Shanxi). Many provinces in this region doubled or even tripled meat output. The share of meat produced in northeastern China and the north China plain rose about 10 percentage points during the 1990s, reaching 36.2 percent in 1999.

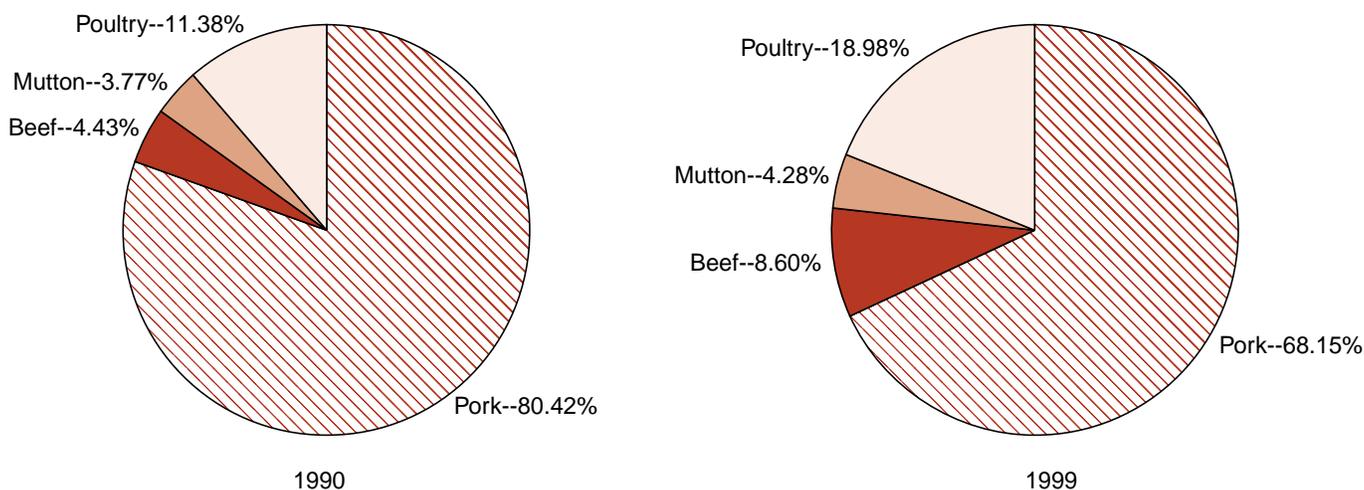
### Meat Consumption Rising, But Prices Weak

Apart from pork consumption, China's per capita consumption of livestock products is still low, compared with Japan, Hong Kong, Taiwan, and Korea (Crook). Meat consumption, however, is growing steadily. Over the past two decades, both rural and urban per capita meat consumption has increased. Rural households (nearly 70 percent of China's consumers) raised their per capita consumption of meat and fish from 12.4 kg in 1983 to 20 kg in 1999, an increase of over 60 percent (table H-1). Urban households consumed more than twice as much meat and fish per capita as did rural households in 1983 (30.6 kg). Urban households also increased consumption, but the increase from 1983 to 1997 was only 15 percent.

The rate of increase in consumption appears to have lagged behind growth in production. Meat production statistics show an increase of over 300 percent from 1983 to 1999, a rate that far exceeds the rate of growth in per capita consumption and population growth. The volume of exports has also been modest. A major reason

Figure H-1

Changes in shares of China's total meat output, 1990-99



Source: China's Ministry of Agriculture.

**Table H-1—Per capita consumption of food grain, livestock products, and fishery products for rural and urban residents, 1983-99**

Year	Food grain		Red meat		Poultry meat		Fishery products	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
	<i>Kilograms</i>							
1983	260.0	144.5	10.0	19.9	0.8	2.6	1.6	8.1
1984	267.0	142.5	10.6	19.1	0.9	2.9	1.7	7.8
1985	257.0	134.8	11.0	18.8	1.0	3.2	1.6	7.1
1986	259.0	137.9	11.8	21.7	1.1	3.7	1.9	8.2
1987	259.0	133.9	11.7	21.1	1.2	3.4	2.0	7.9
1988	260.0	137.2	10.7	19.9	1.3	4.0	1.9	7.1
1989	262.0	133.9	11.0	20.4	1.3	3.7	2.1	7.6
1990	262.0	130.7	11.3	21.8	1.3	3.4	2.1	7.7
1991	256.0	127.9	12.2	22.3	1.3	4.4	2.2	8.0
1992	251.0	111.5	11.8	21.5	1.5	5.1	2.3	8.2
1993	266.0	97.8	11.7	20.9	1.6	3.7	2.5	8.0
1994	257.0	102.0	11.0	20.3	1.6	4.1	3.0	8.5
1995	258.9	97.0	11.3	19.8	1.8	4.0	3.4	9.2
1996	256.2	94.7	11.9	20.5	1.9	5.4	3.7	9.3
1997	250.7	88.6	12.7	19.1	2.4	6.5	3.4	9.3
1998	249.3	86.7	13.2	19.3	2.2	6.3	3.6	9.8
1999	247.5	84.9	13.7	20.0	2.5	4.9	3.8	10.3

Note: Consumption statistics for urban residents are actual quantities purchased.

Source: *China's Statistical Yearbook*, various issues.

for the discrepancies between output and the consumption of meat is the exclusion of away-from-home consumption of meat in the consumption statistics. The statistics likely understate meat consumption because eating away from home has grown markedly over the past 10 years, especially among urban residents.

The discrepancy between consumption and production could also be due to statistical over-reporting of meat output. Since 1997, however, a reduction of hog inventory estimates based on the results of China's first agricultural census has reduced this discrepancy (Colby et al.). China's meat output estimates were adjusted downward by about 20 percent for 1997-99 (table H-2). Still, even after making the adjustment, a pattern of rapid growth in meat output is observed (fig. H-2).

The oversupply of animal products suggested by the statistics should have depressed prices throughout the last 20 years. However, the prices of livestock products grew at a steady pace until 1996. Livestock product prices, like the prices of most grain products, plunged in 1996 and stayed at depressed levels until 2000.

As incomes in China grow, meat demand can be expected to grow further. A U.S. Department of Agriculture Economic Research Service analysis based on China's price and income statistics since the early 1980s found that poultry demand was more sensitive to income growth than pork demand and that rural meat demand responded more to income growth than urban demand (Cao and Huang). Based on these estimates and 1999 consumption levels, a 10-percent increase in income would lead to a 0.17-kg increase in urban per capita pork consumption and a 0.73-kg increase in rural consumption (table H-3). These estimates reflect the much faster growth in rural pork consumption over the past two decades and suggest that much of the potential growth is in rural households. However, rural income growth has been weaker than urban income growth in recent years. Also, per capita pork consumption levels are still significantly higher in urban areas, so the increase in urban population may also play an important role in raising pork consumption.

Poultry consumption per capita would grow by similar amounts in rural and urban households following a 10-percent growth in household income—0.37 kg in urban households and 0.41 kg in rural households.

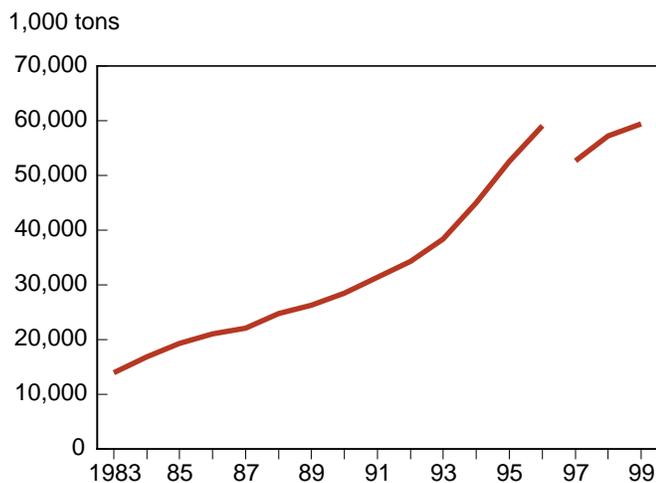
**Table H-2—China's major livestock outputs, 1983-99**

Year	Total meat output	Red meat	Pork	Beef	Mutton	Poultry meat	Eggs	Cow milk
1,000 tons								
1983	14,030	14,030	13,160	321	550	na	3,320	1,845
1984	16,900	15,410	14,450	371	590	1,490	4,320	2,186
1985	19,270	17,610	16,550	471	590	1,600	5,350	2,499
1986	21,120	19,170	17,960	591	620	1,880	5,550	2,899
1987	22,160	19,860	18,350	791	720	2,190	5,900	3,301
1988	24,800	21,940	20,180	961	800	2,740	6,960	3,660
1989	26,290	23,260	21,230	1,071	960	2,820	7,200	3,813
1990	28,570	25,140	22,810	1,261	1,070	3,230	7,950	4,157
1991	31,440	27,240	24,520	1,541	1,080	3,950	9,220	4,644
1992	34,310	29,400	26,350	1,801	1,250	4,540	10,200	5,031
1993	38,420	32,250	28,540	2,341	1,370	2,740	11,800	4,986
1994	44,990	36,930	32,050	3,271	1,010	7,550	14,790	5,288
1995	52,600	42,650	36,480	4,151	2,020	9,350	16,770	5,764
1996	59,150	47,730	40,380	4,951	2,400	10,750	18,540	6,294
1997	52,690	42,500	35,960	4,411	2,130	9,790	18,950	6,011
1998	57,240	45,990	38,840	4,801	2,350	10,560	20,190	6,629
1999	59,490	47,620	40,060	5,051	2,510	11,160	21,350	7,176

Note: na = not applicable.

Source: *China's Statistical Yearbook*, various issues. All statistics after 1996 have been corrected by the National Bureau of Statistics according to China's Agricultural Census results.

Figure H-2

**China meat production, 1983-99**

Source: *China's Statistical Yearbook*, various issues. All statistics after 1996 have been corrected by the National Bureau of Statistics according to China's Agricultural Census results.

Although the increases are similar, the proportionate increase is larger in rural households since that segment begins from a lower base level of consumption. The estimates suggest that poultry will continue to increase its share of both rural and urban consumption relative to pork as incomes rise. Although rural households increase their consumption of pork by almost 2 kg for every 1 kg increase in poultry, this ratio is much lower than the ratio of 5 kg of pork for every 1 kg of poultry consumed in 1999.

Again, official consumption statistics probably understate growth in meat consumption because the statistics exclude food consumed away from home. The actual growth in meat consumption is likely to be much greater when meat consumed in restaurants, food stalls, and institutions, such as schools and research institutes, is taken into account.

In 1999 and 2000, growth in consumption of livestock products in both urban and rural areas slowed due to

**Table H-3—Increased rural and urban pork and poultry consumption from a 10-percent increase in income**

Item	Pork		Poultry	
	Urban	Rural	Urban	Rural
Per capita consumption, 1999 (kg)	16.9	12.9	4.9	2.5
Estimated income elasticity	0.10	0.57	0.76	1.65
Increase in consumption due to 10-percent increase in income (kg) <sup>1</sup>	0.17	0.73	0.37	0.41

Note: Estimates for beef and mutton price elasticities were also made but are not shown in the table.

<sup>1</sup>Increase in consumption calculated using income elasticity and 1999 per capita consumption, assuming prices and other factors held constant.

Sources: *China Statistical Yearbook and China Rural Household Survey Yearbook*, 2000; Cao and Huang.

increased unemployment, downsizing of state-owned enterprises in urban cities, and falling incomes in rural areas (fig. H-3). Government reforms in housing, health, and prescription drug policies also affected disposable income, reducing purchases of nonstaple food, particularly meat.

Prices of major livestock products tended to decline in recent years, with weakening demand and strong production growth. In 2000, pork, beef, and mutton prices were stable, but poultry and egg prices fell and rose slightly during the second half of the year (fig. H-4). Falling poultry prices during the first half of 2000, due to rapidly increasing poultry production (particularly near large cities), may have contributed to the increase in poultry consumption. Cao and Huang estimated that a 10-percent decrease in poultry prices leads to a 5.3-percent increase in urban per capita poultry consumption and a 2.8-percent increase in rural poultry consumption.

For 2001, China's Ministry of Agriculture projects that changes in pork prices will become seasonal as output continues to increase. China's consumers have preferred to eat more beef and mutton in recent years due to rising incomes. Beef and mutton prices are expected to stay stable, similar to prices in 2000. In contrast, poultry meat and eggs have been over supplied in recent years and their prices in 2001 will likely remain low and unstable, similar to prices in 2000.

### ***Livestock Share of Trade Is Small***

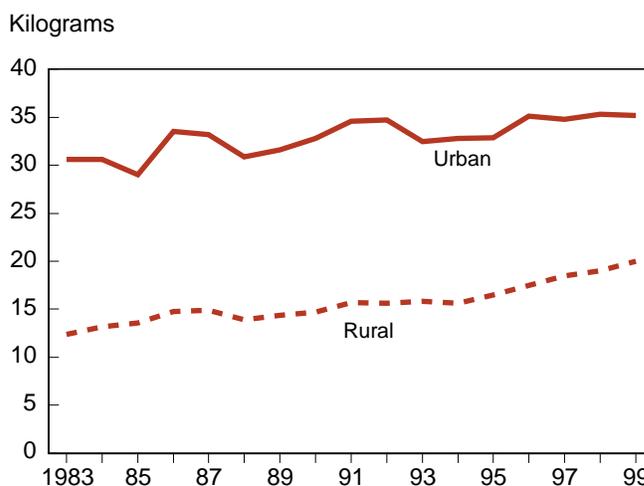
China's imports and exports of livestock products, in terms of both volume and value, are small shares of total agricultural trade. Until 1970, the animal products' (mostly pork and live hogs) share of total value of agricultural exports was about 10 percent. Since the early 1980s, the quantities of exported meat and live

animals, in general, have been stable. Livestock products' share of total agricultural exports has decreased as agricultural trade expanded due to foreign trade liberalization and government promotion of other agricultural exports, such as grain, horticultural products, and processed food.

Over the past four decades, China predominantly shipped live animals, pork, beef, and poultry to a small group of countries (see table H-4 for 1992-99 trade). Hong Kong and Macau were the major export destinations for China's live animal exports. Poultry meat was mainly shipped to Japan. Pork and beef were exported to Russia, with a small portion also going to Hong Kong and the Middle East. China also imports specific poultry cuts, mainly feet and wings, from Hong Kong.

Figure H-3

### **Per capita consumption of meat and fish, rural and urban residents, 1983-99**



Note: Consumption statistics for urban residents are actual quantities purchased. Food consumed away from home is not included.

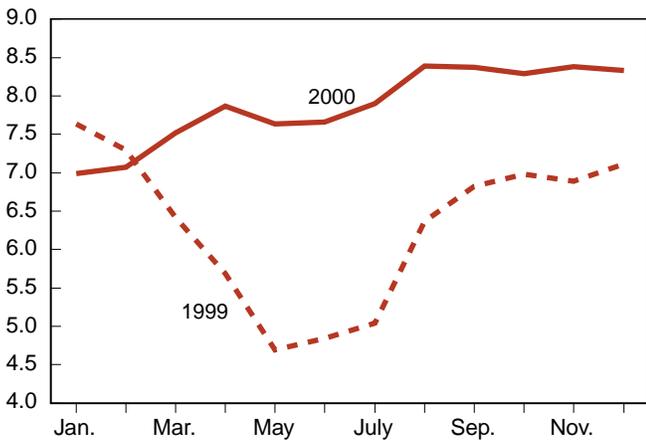
Source: *China's Statistical Yearbook*, various issues.

Figure H-4

**Changes in rural market prices of hogs, beef, mutton, chicken, and eggs, 1999-2000**

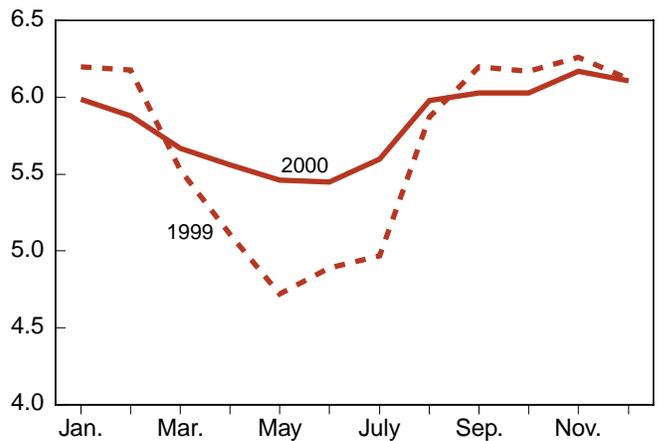
**Feeder pigs**

Yuan per kilogram



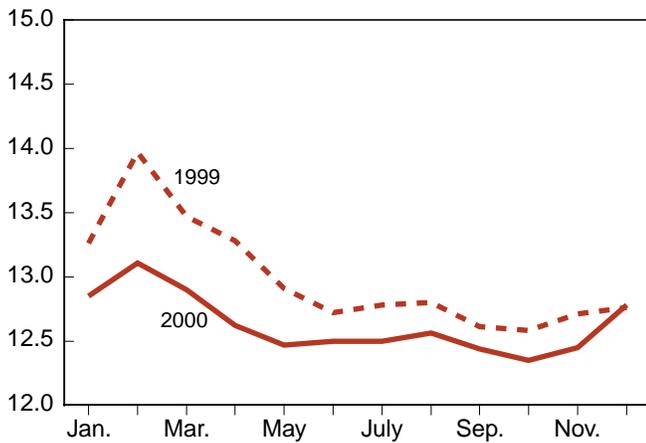
**Live hogs**

Yuan per kilogram



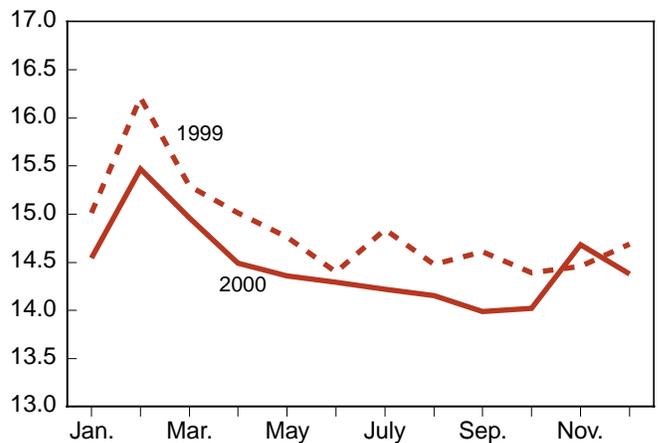
**Boneless beef**

Yuan per kilogram



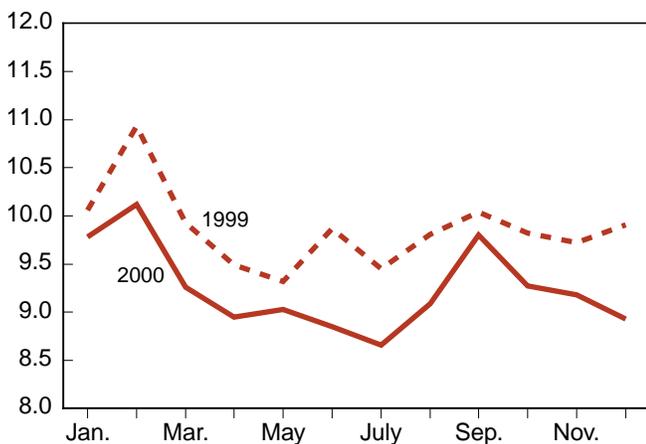
**Mutton, bone-in**

Yuan per kilogram



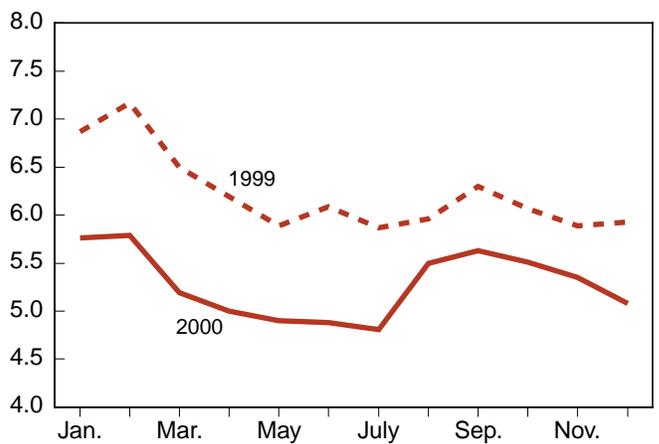
**Live chickens**

Yuan per kilogram



**Eggs**

Yuan per kilogram



Source: China's Ministry of Agriculture.

**Table H-4—Volume and value of China's trade of major livestock products, 1992-99**

Year	Frozen, fresh		Frozen, fresh		Chicken	Eggs
	Live hogs	Live poultry	beef	pork	meat	
	-----1,000 head-----		-----1,000 tons-----			Million pieces
<b>Exports:</b>						
1992	2,900	49,557	24	50	93	--
1993	2,720	51,150	22	60	107	611
1994	2,700	52,300	20	100	164	486
1995	2,533	52,630	20	154	249	358
1996	2,402	53,773	29	129	304	520
1997	2,270	52,675	31	103	303	733
1998	2,195	42,616	43	105	286	577
1999	1,958	45,000	19	54	315	466
<b>Imports:</b>						
1992	--	2,684	1	--	78	--
1993	--	1,710	2	--	99	4
1994	1	1,849	3	--	136	6
1995	97	1,788	3	3	261	2
1996	1	1,362	3	2	308	3
1997	11	1,077	3	3	205	2
1998	2	715	4	16	192	2
1999	na	na	5	58	760	na
<i>Million dollars</i>						
<b>Exports:</b>						
1992	290	94	39	76	166	--
1993	272	90	28	63	185	28
1994	269	105	31	128	380	18
1995	278	125	34	245	621	17
1996	291	121	51	215	643	25
1997	299	114	54	195	568	25
1998	289	96	73	181	483	19
1999	236	99	26	67	500	12
<b>Imports:</b>						
1992	--	26	4	0	50	--
1993	--	11	5	0	58	1
1994	1	10	5	0	72	1
1995	2	15	4	1	80	2
1996	2	15	4	1	138	1
1997	2	14	3	2	127	1
1998	3	10	5	7	106	1
1999	4	11	6	24	392	1

Note: -- = negligible amount. na = not applicable.

Sources: China's Customs statistics and *China Monthly Exports and Imports*, December, various years.

In general, China has been a net exporter of livestock products. However, with the exception of poultry and meat, annual trade values of China's livestock products have generally been small. Poultry exports have grown rapidly, but the quantity is still quite low. Neither the structural change in China's livestock production nor the growing discrepancy between China's livestock production and consumption levels has resulted in an increase in livestock product trade.

Several factors account for China's low trade in livestock products. First, the government uses high tariffs and quotas to limit imports of meat products to insulate the domestic industry from foreign competition. Throughout the 1980s (and even, to a limited extent, in the 1990s) the government managed trade of livestock products, particularly imports, relatively closely. Second, China faces a number of disease-control issues (e.g., foot-and-mouth disease) that limit its ability to export. Finally, China's poor infrastructure and transportation system make it difficult to transport and store commodities. In particular, the lack of sufficient refrigeration facilities, both in terms of fixed storage and rail or truck, limits the trade in fresh or frozen meat products.

### ***China's Livestock Products Internationally Competitive***

As China nears accession to the World Trade Organization (WTO), there is growing interest in evaluating the country's potential for increasing exports of livestock products. This potential, in part, depends on production costs, domestic and international market prices, exchange rates, transportation costs, disease control, and other factors.

Does China have a comparative advantage in livestock production compared with other major countries? ERS measured several indicators developed by Pearson in 1976—domestic resource cost coefficients (DRCC), net social profitability (NSP), and effective rate of protection (ERP)—to evaluate the comparative advantage of livestock production in China for the period 1990-98 (see box). Indicators were measured for three animal products—hogs, cattle, and broilers—and three grains—wheat, rice, and corn.

Major findings from the estimated results can be briefly summarized as follows (table H-5):

1. Production of hogs (backyard production activities), beef cattle (rural household production), and broil-

## **Indicators of Comparative Advantage**

***Domestic Resource Cost Coefficient (DRCC)***—Assuming free trade, DRCC of an agricultural commodity can be estimated by dividing its domestic resource costs (DRC) with shadow exchange rates, where DRC is the sum of opportunity costs of all domestic resources needed to produce (or to save) an additional unit of shadow income (or foreign exchange). If  $DRCC < 1$ , it indicates that the product generates an income higher than input costs used, and therefore the country has some comparative advantage in producing the commodity. On the contrary,  $DRCC > 1$  indicates a disadvantage in producing the product because the additional unit of output is worth less than the total costs needed for producing such an output.

***Net Social Profitability (NSP)***—Net social profitability can be estimated by subtracting all input costs from the sum of their opportunity costs plus any externalities. NSP indicates the profit of producing a commodity by efficiently utilizing all foreign and domestic resources. Therefore,  $NSP > 0$  indicates positive profitability of growing or raising a product. If  $NSP < 0$ , the product is not profitable, indicating an inefficient allocation of resources in production of the output.

***Effective Rate of Protection (ERP)***—ERP reflects the increased percentage of added value of one commodity due to protection policies relative to what would occur under free trade conditions.  $ERP > 0$  reflects positive protection, meaning that current comparative advantage would be reduced if protection policies are removed, hence decreasing the trade competitiveness of the product in the international market.  $ERP < 0$  indicates that the product receives negative protection. Removing negative support of a product would increase its trade competitiveness in the international market.

ers (specialized household production) was fairly competitive. Estimates of degrees of comparative advantage (DCA) for hogs ranged between 0.37 and 0.61, beef cattle estimates ranged between 0.48 and 0.79, and broilers estimates ranged between 0.24 and 0.60. For example, in 1990, DCA estimates were 0.45 (hogs), 0.63 (beef cattle), and 0.43 (broilers), implying production of 1 unit of shadow income for the respective animals required units of

input of 0.55 (hogs), 0.37 (beef cattle), and 0.57 (broilers). Similarly, in 1998, producing a unit of shadow income from hogs, beef cattle, and broilers required units of input of 0.45 (hogs), 0.39 (beef cattle), and 0.40 (broilers). The estimates indicate that China's comparative advantage in producing the three livestock animals remained strong.

Unlike for livestock products, China's comparative advantage in grain production has gradually fallen.

For example, in 1990, the DCA estimate for wheat production was 0.31, implying wheat growing was competitive and efficient. However, the same estimate fell to negative 0.20 in 1993, indicating that producing 1 unit of shadow income required 1.20 units of inputs. Since 1993, estimated DCAs for wheat have remained negative, explaining why Chinese researchers and government officials frequently indicate that China would likely import wheat in the future.

**Table H-5—The degree of comparative advantage, net social profitability, and effective rate of protection of China's major grain and animal products, 1990-98**

Commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
<b>DCA:</b>									
Hogs	0.45	0.59	0.55	0.61	0.58	0.47	0.39	0.37	0.55
Cattle	0.63	0.48	0.68	0.70	0.61	0.76	0.79	0.76	0.61
Broilers	0.43	0.41	0.24	0.49	0.47	0.51	0.45	0.39	0.60
Wheat	0.31	0.25	0.24	-0.20	-0.27	-0.28	-0.10	-0.18	-0.07
Rice	0.69	0.69	0.78	0.72	0.58	0.53	0.30	0.12	0.16
Corn	0.54	0.64	0.49	0.51	0.38	0.02	-0.09	-0.17	-0.20
<i>Yuan per kilogram</i>									
<b>NSP:</b>									
Hogs	0.79	1.57	1.27	1.71	2.44	1.83	1.39	1.32	0.91
Cattle	3.39	2.66	3.71	3.22	3.13	3.28	4.12	3.55	1.18
Broilers	1.58	1.41	0.54	2.16	2.43	2.84	1.99	1.79	0.64
Wheat	0.16	0.13	0.13	-0.09	-0.12	-0.16	-0.09	-0.15	-0.06
Rice	0.65	0.62	1.19	0.86	1.01	0.86	0.38	0.13	0.14
Corn	0.28	0.41	0.26	0.21	0.24	0.01	-0.06	-0.11	-0.11
<b>ERP:</b>									
Hogs	0.57	0.06	0.30	0.15	0.47	0.42	0.73	0.65	0.68
Cattle	-0.57	-0.53	-0.65	-0.58	-0.45	-0.36	-0.41	-0.37	-0.53
Broilers	-0.27	-0.34	-0.10	-0.43	-0.36	-0.49	-0.32	-0.43	-0.55
Wheat	0.49	0.25	0.21	0.36	1.67	1.58	0.55	0.34	0.23
Rice	-0.32	-0.47	-0.59	-0.46	0.02	0.17	0.08	0.09	0.48
Corn	-0.31	-0.46	-0.23	0.24	0.35	0.81	0.52	0.40	0.71

Note: For straightforward interpretation of the results, the  $DCA=1-DRCC$  is calculated and listed in this table.  $DRCC=DRC/(NV*EX)$ , where DRC denotes domestic resource costs, NV denotes the added value based on border prices, and EX denotes the opportunity cost of the foreign exchange, or shadow exchange rate.  $NSP=(U-M-R)*V-\sum FV+E$ , where U denotes output value based on border prices, M denotes value of all importable intermediate input in c.i.f., R denotes the opportunity cost of all foreign used or produced inputs, V denotes shadow exchange rate in terms of domestic currency, FV denotes the opportunity cost of each input needed to produce a product, and E denotes the effect of externality.  $ERP=(t_p-\sum a_i t_i)/(1-\sum a_i)$ , where  $t_p$  denotes the duty rate of output  $p$  and  $t_i$  denotes the duty rates for input  $i$  for producing  $p$ ,  $a_i$  denotes the quantities of importable input  $i$  for producing output  $p$ . DCA and ERP are unitless. Data used for the estimation include production costs from the publication entitled *Compilation of Production Costs of China's Agricultural Commodities*, border prices and volume of imports and exports from the *China Customs Statistics*, commodity prices from the *China Price Yearbooks*, shadow prices from *Economic Evaluation Methods and Parameters on Development Projects*, input quantities and coefficients from the input-output tables published by the National Bureau of Statistics (or SSB), tariff rates from the *China Tax Collections*, and investment and interest payments from the *China Finance Yearbooks*.

Source: Tuan et al., 2001.

2. NSP estimates for hogs, beef cattle, and broilers are all positive and almost all generally greater than 1, although estimated NSP for hogs and broilers declined in the late 1990s. Overall, estimated NSPs appear to indicate that China's production of hogs, beef cattle, and broilers has been efficient, suggesting a reasonable allocation of resources.

On the contrary, NSP estimates indicate that current wheat and corn production in China is not competitive. For 1990, estimated NSPs were 0.16 (rice), 0.65 (wheat), and 0.28 (corn), implying that production of 1 kilogram of rice, wheat, and corn could generate 0.16, 0.65 or 0.28 yuan, respectively, of net profit. In 1998, NSPs for wheat and corn were -0.06 and -0.11, indicating losses of 0.06 yuan (wheat) and 0.11 yuan (corn) for each kilogram produced.

3. Estimated ERPs in table 5 reveal that hog production received positive protection over the entire study period in China, but production of beef cattle and broilers always received negative protection for the same time period. Freer trade, through accession to the WTO or other measures, may reduce the trade competitiveness of China's pork trade in the future. In contrast, reduction or elimination of negative protection of beef cattle and broilers would increase the trade competitiveness of those two products.

As for grains, ERPs for rice and corn became positive, reaching 0.48 and 0.71 in 1998. It implies that rice and corn trade became less competitive in the international market compared with earlier years. If China accedes to the WTO, its trade of these commodities would face great competition if it chooses not to reduce or eliminate its support policy. Wheat, which has a positive ERP throughout the period, would also be affected, although its 1999 ERP is lower than rice and corn.

### ***Summary and Trade Implications***

China's livestock and feed production grew rapidly over the last 20 years. Rapid growth of income due to rural and economic reforms beginning in the late 1970s, together with favorable government policies that facilitated livestock production, steadily increased rural and urban per capita consumption of animal products.

Based on livestock statistics published by the Chinese government, China's per capita availability of livestock products, particularly meat, grew significantly faster than rural and urban per capita consumption. With only small quantities of meat products exported to a few countries, as well as Hong Kong and Macau, parts of China encountered regional surpluses of meat output over the last few years. China's government officials and scholars have begun to explore the possibility of shipping meat to international markets, but large export volumes have yet to materialize.

Indicators incorporating the concepts of domestic resource costs, net social profitability, and effective rate of protection suggest that China's production of hogs, beef cattle, and broilers has been competitive in trade and hence had a comparative advantage in producing those products. This preliminary conclusion is also supported by the estimates of NSP of the three products, because levels of net social profitability in producing the products were positive.

However, the estimated ERP for the three products indicates that hog production has received positive protection. Reduction or elimination of the support would decrease China's comparative advantage in producing hogs and reduce its trade competitiveness. Beef cattle and broilers, in contrast, received negative protection based on ERP estimates. China's government could reduce the negative protection to make the output of beef cattle and broilers more competitive in world markets, particularly as China is expected to join the WTO by early 2002.

It is important to note that world meat and other livestock product trade is also constrained by issues such as sanitary standards. China's hog and chicken exports, for example, are constrained because most countries prohibit the importation of livestock products from disease-endemic nations. This constraint makes China's livestock product trade more difficult than nonanimal product trade. Accession to the WTO will ensure China's access and status on the "international platform" in terms of negotiating conflicts over trading issues with other countries, but sanitary and other livestock trade issues will take a long time to be resolved among all member countries.

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# China's Cotton Reserves To Meet Shortfall, Avert Price Rise

Hsin-Hui Hsu and Fred Gale

**Highlights:** Farmers are growing more cotton than was planned to fulfill orders from textile producers experiencing strong export growth. Textile and apparel exports rose 21 percent in 2000 to over \$52 billion. Government policy-makers, voicing concerns about excess production, discouraged producers from expanding cotton acreage and sold stocks to stabilize prices. China's farmers have readily adopted genetically modified pest-resistant cotton, the first successfully commercialized product of China's genetically modified crop research efforts.

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Rising textile exports in 2000 spurred demand for cotton, encouraging China's farmers to expand acreage devoted to the crop. Although it reduced its role after the 1999 liberalization of the cotton sector, the government continued to intervene by selling cotton stocks to avert price increases.

According to China's National Bureau of Statistics (NBS), cotton area rose to 4.0 million hectares in 2000, up about 275,000 hectares from 1999 (fig. I-1). However, cotton acreage was still about 450,000 hectares below the 1998 level, and far below the peak of 6.8 million hectares in 1992.

The government, under pressure to draw down large cotton stocks, sought to control cotton production while market signals were encouraging producers to expand. Following liberalization of the cotton market in 1999, the government no longer directly controls cotton prices and production. The government tries to guide the market by issuing production "forecasts," or targets. In January 2000, the government forecast a 10-percent decline in cotton acreage for 2000, but acreage actually rose over 5 percent. Reports of further increases in acreage in 2001 were contrary to government plans for reduced cotton plantings.

Cotton prices recovered in 2000 from steep drops in 1999, although prices were still below 1998 levels. Grain prices have been weak in recent years, increasing the relative profitability of cotton and

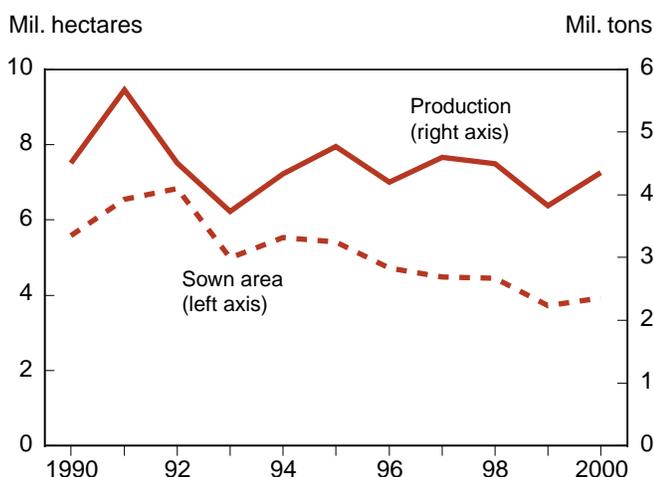
encouraging expansion of cotton area. Some farmers delayed bringing their cotton to market in the hope that prices would rise further. Enterprises were also reported to have stockpiled cotton in anticipation of even higher prices.

The government, still holding considerable cotton stocks accumulated during the 1990s, intervened in cotton markets by selling stocks to moderate price rises. The newly established China National Cotton Exchange has played the lead role in disposing of surplus stocks that accumulated in the mid- and late 1990s (see box). Since the exchange opened in April 2000, it has sold more than 2 million tons, about 10 percent of annual world cotton consumption.

During 2000, it was reported that 900,000 tons of cotton stocks were released on the market. In late 2000, officials signaled that China could sell an additional 400,000 tons in 2001.<sup>1</sup> In November 2000, an official of the State Planning and Development Commission estimated total demand for cotton would exceed expected production by about 1.2 million tons. However, officials continued to emphasize that China's stocks are sufficient to cover the difference between production and demand.

<sup>1</sup> Zhao Huanxin, "State Poised to Curb Lofty Cotton Prices," *China Daily*, November 28, 2000.

Figure I-1

**Cotton production and sown area, 1990-2000**

Source: *China Rural Statistical Yearbook*.

The Ministry of Agriculture (MOA) originally planned to cut the amount of cotton grown by 10 percent in 2000. The government's plan called for cotton output to be capped at 3.2 million tons—down 630,000 tons from 1999/00. However, production actually rose to 4.42 million tons in 2000/01 (table I-1). In February 2001, MOA announced that growth in cotton acreage would be limited to 333,300 hectares, for an expected cotton area of 4.2 million hectares and production of 4.25 million tons in 2001. This acreage would be an increase over 2000 but still less than 1998 cotton area.

U.S. Department of Agriculture (USDA) estimates of China's cotton ending stocks for 1991/92 to 1999/00 were revised in 2000. These changes reflect new information about cotton use in China's yarn production. USDA's consumption estimates for China account for both mill and nonmill use of cotton. The mill use category estimates are derived from monthly and annual yarn production data as reported by NBS. The nonmill use category includes wadding, military, medical, and

on-farm use of cotton, plus an allowance for processing waste. From 1985 to 1991, USDA relied on data published in China's *Textile Industry Yearbook* to determine cotton's share of yarn production. In 1992, this share data series was discontinued and USDA analysts estimated the share, assuming a downward trend based on competitive prices from synthetic fibers. However, an official from the State Textile Industry Bureau and Bureau of Cotton and Jute indicated that further reductions were needed in the cotton share series beginning in 1992/93. The nonmill use estimate was been raised from 450,000 to 600,000 tons for 1992/93 through 1999/00, partially offsetting the reductions to the mill use category. The cumulative and combined effect of these changes raised 1999/00 beginning stocks by 0.8 million tons to 4.6 million tons.

**Booming Textile and Apparel Exports**

China's exports of yarn, fabric, and apparel were \$52.1 billion in 2000, up 21 percent from 1999. Export growth was particularly strong during the first half of 2000, when textile exports jumped 41.8 percent over year-earlier levels (fig. I-2). The large jump in early 2000 may have affected farmers' planting decisions. Cotton imports were \$13.9 billion in 2000, up 14.9 percent over 1999. Another favorable development for cotton fiber demand was the rise in petroleum prices, which made synthetic fiber more expensive, prompting Chinese textile producers to increase their use of cotton, putting additional upward pressure on cotton prices.

China was again a net exporter of raw cotton in 2000/01, as it was in 1999/00. This was a significant turnaround from most years of the 1990s, when China was a net importer of cotton (fig. I-3). Exports of raw cotton also rose for a third straight year in 1999/00, reaching 370,000 tons. Cotton imports were low for the second consecutive year, at 26,000 tons. An estimated export subsidy of 2,700 yuan (\$325) per ton for

**Table I-1—China's cotton production, trade, and stocks, 1997/98-2001/02**

Item	1997/98	1998/99	1999/00	2000/01	2001/02
	<i>Million tons</i>				
Production	4.59	4.51	3.83	4.42	5.01
Imports	0.40	0.08	0.03	0.05	0.15
Domestic use	4.27	4.18	4.83	5.12	5.06
Exports	0.01	0.15	0.37	0.10	0.09
Stocks	4.35	4.60	3.26	2.51	2.52

Source: U.S. Department of Agriculture, *World Agricultural Supply and Demand Estimates*, October 12, 2001.

## Organization and Operation of the China National Cotton Exchange

The Chinese government officially opened the China National Cotton Exchange (CNCE) in Beijing in April 2000. The CNCE is administratively under the All China Supply and Marketing Cooperatives (SMC), but there are 12 other government agencies that help supervise its operations. Through its headquarters in Beijing and its 20 branch offices, the exchange serves as an electronic cotton spot market and as the focal point for the government's stock disposal program. Trading on the exchange is by membership and there are currently about 125 members, most of whom are either SMC companies or textile mills. Each member has to commit to an annual trade volume of 15,000 tons and pay an annual membership fee of about \$12,000, plus an initial trading-seat fee of about \$24,000. Members may purchase cotton for a nonmember but are officially prohibited from making speculative purchases.

In principle, the CNCE provides three different procedures for trading cotton, including an open-auction and bidding system, a negotiated contract, and a contract for delivery stations at specific warehouse locations. However, in practice, the large sales of government reserve cotton have been accomplished using only the open auction and bidding system. The minimum bid prices are determined by

applying a formula that takes into account the initial procurement price, storage, and other costs. The buyers are responsible for loading and transportation costs. The CNCE contracts are spot market sales, subject to immediate settlement. To ensure completion for each transaction, CNCE requires an earnest deposit. Before the day of delivery, the buyer must pay off the entire amount as specified in the contract.

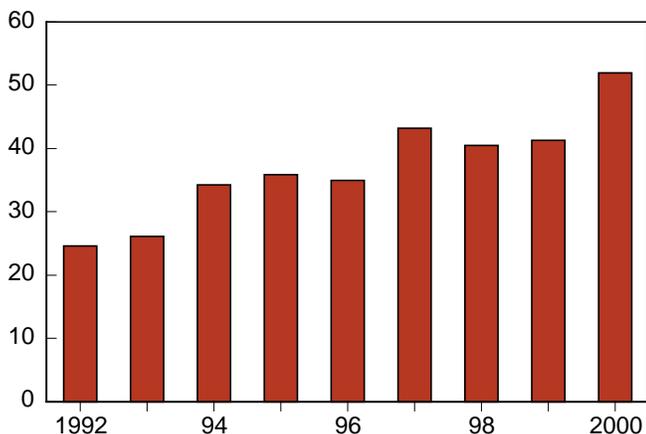
The CNCE re-certifies cotton by lot only upon request because all cotton harvested in China is ginned and baled with a certification of classification and grade. However, cotton stored in remote areas or only traded in small volume is unlikely to be re-inspected and likely to retain the original grade at the time of ginning.

If a transaction cannot be fulfilled for some reason, the CNCE serves as a mediator to make adjustments. However, if nonperformance is due to a subsequent movement in market prices, CNCE has the right to confiscate the deposit from the party that breached the contract agreement and make compensation to the other party. CNCE also has the right to suspend members' trading rights for up to a month when necessary. The identity of repeat offenders will be made public to traders in the exchange.

Figure I-2

### Textile exports grew sharply in 2000

Bil. dollars

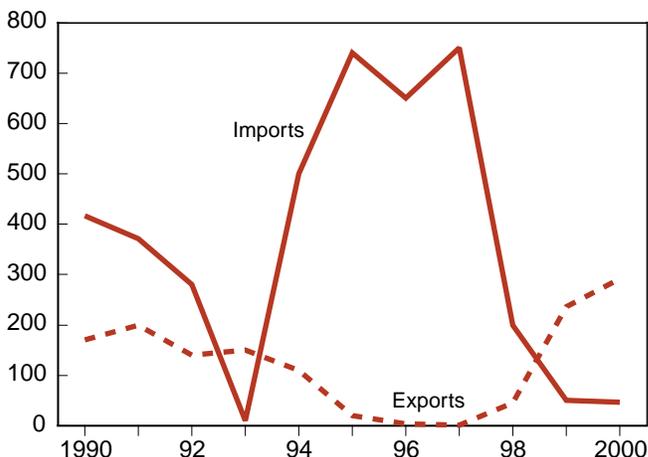


Sources: *China Rural Statistical Yearbooks* and news reports.

Figure I-3

### Cotton imports and exports, 1990-2000

1,000 metric tons



Sources: *China Rural Statistical Yearbook* and news reports.

inventories of Xinjiang cotton produced in earlier years (i.e., prior to 1998 crops) was responsible for most of the calendar year 2000 exports. Subsidized exports are expected to continue at a substantially lower subsidy level of 1,000 yuan per ton in 2001 and will be eliminated once China becomes a member of WTO. Due to the need to sell its surplus stocks, China's government has restricted most imports of cotton since a series of government reforms were instituted in 1999. This policy has been effective in reducing the backlog of government-held stocks, but it has also boosted China's internal prices above world market-clearing levels.

The textile sector was one of China's fastest growing industries in 2000, earning a net profit of \$3.5 billion in 2000, more than double the industry's 1999 profits. State-owned textile enterprises earned \$840 million in 2000 after losing \$9 million in 1999. However, it is reported that more than a third of state-owned textile enterprises are still losing money. Plans to downsize inefficient textile plants led to worker protests in Anhui and Guangxi provinces in late 2000 and early 2001. Nonstate-owned enterprises tend to perform better than state-owned enterprises. Nonstate-owned enterprises accounted for more than three-fourths of textile industry profits in 2000, and their profits were up 79 percent over 1999.

The performance of textile enterprises varied geographically and across subsectors. Profits earned in western and central China were much lower than those earned in the eastern China. Of the 31 provinces and self-governing municipalities, 10 had textile enterprises that were not profitable. Nine of those 10 were in western and central China. Profits earned in various industries in the textile sector differed considerably, with the garment industry totaling 3.1 billion yuan, the cotton textile industry totaling 3 billion yuan, and the chemical fiber industry totaling 2.6 billion yuan.

China's State Textile Industry Bureau (STIB) has expressed concern that an overzealous increase in production capacity could lead to overproduction and future problems for the industry. Imports of textile-spinning machinery rose 93 percent to \$351 million in 2000, indicating a rapid increase in capacity. In 1996, the State Council issued a regulation to control expansion of the textile industry in accordance with market demand. The regulation requires textile machinery producers and purchasers to have permits from the STIB before setting production targets and arranging

any purchase orders of machines. Key parts of cotton-spinning frames must be labeled with producers' names as well as product types and dates of production. Companies found in violation of the regulation can have their machines and incomes confiscated and their business licenses revoked. The State Council also instructed trade departments to strictly monitor imports of cotton textile machines, especially spinning frames. Companies caught illegally importing textile machinery can lose their rights to import and face severe penalties. Companies must also register textile machinery production for export with the STIB. Producers who sell textile machines made for export on the domestic market can lose their export rights.

China's textile and apparel industry is expected to grow substantially in the coming years. In fact, textiles and apparel may benefit more than any other industry from China's accession to the WTO. In February 2001, China's textile industry representatives set a growth target of 6.5 percent per year between 2001 and 2005 to reach an output of \$132.5 billion with exports of \$65 billion.<sup>2</sup> Increased textile exports may stimulate the domestic demand for cotton. China's accession to the WTO, however, will also open the country's market to imported cotton, intensifying competition for domestic cotton producers because domestic cotton prices currently exceed international levels.

While an expanding textile industry suggests greater demand for cotton, the targeted areas of growth are largely in value-added processing and in textile products that use other inputs besides natural fibers. The industry anticipates needs for improved science and technology, more efficient energy use, and changes in product mix and industrial structure. Government planners are encouraging producers to shift to products with higher value added, improve design capabilities, and increase production of chemical fabrics and decorative and industrial textiles.

Textile industry officials have emphasized the need to continue restructuring the industry. Inefficient, unprofitable state-owned enterprises are being phased out. Regional specialization in textile production is planned. Enterprises in eastern China are expected to focus on producing branded products for export, while enterprises in inland China will primarily supply the domestic market or make ethnic specialty products.

<sup>2</sup> Dai Yan, "Output Target Set For Textiles," *China Daily*, February 3, 2001.

## ***GMO Cotton Expanding Rapidly***

Cotton has been the first major beneficiary of China's investment in genetically modified (GM) crop research. GM crop production is an emerging issue in China. Consumer environmental and safety concerns are not at the level seen in many Western countries. China's government views GM crops as a potential boon to the country's impoverished farmers, but the government is being cautious in its approach to GM crops. In June 2001, the government issued regulations that required companies and research institutes involved in GM research to register with the government and required labeling of products containing genetically modified organisms. The impact of these new regulations has not yet been evaluated.

The Chinese government has sponsored a considerable amount of GM crop research since the late 1970s, but only a handful of GM plants have been given licenses for commercial promotion by MOA. Of those, two types of cotton are the only GM crops that have been widely adopted by Chinese farmers. A local variety developed by the Chinese Academy of Agricultural Sciences (CAAS) and an American variety developed by the Monsanto company were both approved for use in 1997. These cotton varieties were genetically engineered to produce a toxin that kills boll worms, a troublesome pest that is a major threat to cotton production. The two seed types are now competing with each other to capture China's cottonseed market.

Monsanto China has invested heavily in promoting its BollGard cotton in northern China. By entering a joint venture with the seed company of Hebei province (north China plain area), Monsanto secured a majority share of the seed market in that province. Farmers have been eager to adopt the GM seeds because they help ensure a stable output of quality cotton and reduce the labor requirements and cash expenses needed for insect control. In many areas, GM varieties account for nearly all cotton production.

CAAS GM crop research focused on developing a high-yielding, pest-resistant plant in a country long plagued by food and cotton shortages. Now, CAAS estimates that its seeds were used on about 366,670 hectares, roughly 9 percent of total sown area, of cotton fields across China in 2000. CAAS researchers have developed four subtypes of these cotton varieties

to meet the different weather and soil conditions in different regions. CAAS estimates that farmers could save as much as 3,750 yuan (\$451) per hectare by reducing use of pesticide and labor in preventing boll worms.

Both GM brands are more expensive than ordinary cottonseeds. BollGard seed is about 100 yuan (\$12) per kilogram, while the CAAS brand is about 50 yuan. Ordinary cottonseed is about 10 yuan per kilogram. The high prices of the GM brands do not seem to bother cotton growers. Farmers feel that the cost savings associated with the GM seeds (in reduced pest control) and lower risk associated with medical expenses from applying chemicals justify the higher price of seed.

While GM initiatives in other countries have faced opposition on ethical and ecological grounds, the CAAS GM program has faced mainly financial pressures to recover the substantial investments made by the government in GM crop research. China does not require labeling of GM cotton, but GM crops must pass an assessment by MOA's Committee of Genetics Engineering Safety before being approved for commercial application.

Besides GM cotton, China has developed naturally colored cotton, which requires no bleaching and dying, thus reducing pollution produced in the treatment process. Government bureaus concerned with environmental protection, quality, inspection and foreign trade are exploring ways to label naturally colored fibers as environmentally friendly to facilitate sales to countries with "green" trade barriers. Colored cotton can be sold for two or three times the price of ordinary cotton. Multicolored cotton has been introduced in many provinces but is so far best suited for Xinjiang. Currently, about 4,000 hectares of brown, green, and light-tan cottons are available in Xinjiang and sown area is expected to expand to more than 30,000 hectares in 2001/02.

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# USDA Revision of China Grain Stock Estimates

Hsin-Hui Hsu and Fred Gale

**Highlights:** On May 10, 2001, USDA released a new set of ending stock estimates for China wheat, corn, and rice that more accurately reflected world market conditions. Total grain stocks were raised 164 million tons, a net increase of 250 percent from April 2001's estimates. For years, the earlier estimates performed well as an indicator of tightness in Chinese and world markets for grain. However, new information from China's agricultural census, various government statements, and inconsistencies between stock estimates and China's trading patterns made it apparent that a revision of China grain stock estimates was needed.

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The U.S. Department of Agriculture's (USDA) April 2001 World Agricultural Supply and Demand Estimate (WASDE) report carried an estimate of 65.78 million tons of ending grain stocks in China, including 13.75 million tons of wheat, 32.03 million tons of corn, and 20 million tons of rice. USDA must estimate China grain stock levels from sparse information, because China's government considers its grain stocks to be a state secret and does not publish any information on actual grain inventories. USDA's April 2001 stock estimates were much lower than published reports in the Chinese press and considerably lower than target levels mandated by China's internal grain policies. USDA's estimates suggested a low ratio of stocks-to-use, yet China did not give any indication of intent to make significant grain purchases from the world market. Therefore, USDA concluded that current grain stock estimates needed a significant revision to more accurately reflect the true supply-and-demand balance in China.

Major revisions of China's agricultural statistics following the country's 1997 agricultural census also made it necessary to revise grain stock estimates. China's National Bureau of Statistics (formerly known as the State Statistical Bureau) revised downward its estimates of animal inventories and meat output. The revised series implied that USDA had previously over-estimated feed use of coarse grains, as well as low-quality wheat and rice feeding, thus underestimating stocks.

After reviewing data and consulting with knowledgeable experts, USDA more than tripled its 2000/01 China grain stock estimate from 65.7 million tons to 229.7 million tons (table J-1). USDA also revised estimates for earlier years. This revision had a noticeable effect on world grain supply estimates because China accounts for a large share of world grain stocks.

USDA's substantial upward revision of China's grain inventory estimates more accurately reflects the supply-and-demand situation in China. A spokesman for China's Ministry of Agriculture commented that the new estimates were "close to reality." The revisions were widely anticipated by commodity traders and analysts, although the magnitude of the changes was surprising to some observers. However, publication of the revised estimates on May 10, 2001, had little impact on markets.

Grain stocks are held by government entities, the commercial sector, and farm households. Although China's grain stocks are a large share of its total grain supply (as compared with the United States), only a small share of those stocks are likely to enter the market in response to price fluctuations. Farmers own the largest portion of total grain stocks and would like to keep the grain for own-consumption when rising prices cause food insecurity. It should be noted that the ratio of stocks-to-use for grain in China is higher than in most other countries. China holds large grain stocks

**Table J-1—USDA revised estimates of China's grain ending stocks, crop year**

	New series (May 2001)				Old series (April 2001)			
	Wheat	Corn	Rice	Grains	Wheat	Corn	Rice	Grains
	<i>Million tons</i>							
1995/96	59.8	89.6	84.5	233.9	24.3	36.7	21.7	82.7
1996/97	60.9	102.3	88.5	251.7	24.2	51.0	25.5	100.7
1997/98	71.1	87.7	93.0	251.8	33.5	36.0	27.0	96.5
1998/99	66.4	102.1	96.0	264.5	27.9	51.6	27.5	107.0
1999/00	65.2	102.3	98.5	266.0	25.2	52.9	26.5	104.6
2000/01	54.2	80.5	95.0	229.7	13.7	32.0	20.0	65.7

Source: U.S. Department of Agriculture, *World Agricultural Supply and Demand Estimates*.

Complete table accessible at <http://www.usda.gov/oce/waob/wasde/wasde.htm>

as insurance against catastrophic crop failures or other disruptions that could affect China's food supply or force the country to rely on imported grain. China has a strong preference for self-sufficiency in grain.

This article provides background information used by USDA in revising estimates of China's grain inventories. Because insufficient data were available to make direct estimates, USDA had to rely on publicly announced grain stock numbers, knowledge about China's grain reserve policy, and information about the roles of on-farm, commercial, and government-mandated reserves in grain markets.

### ***Other Estimates of China's Grain Stocks***

China released several grain stock figures to the public in the months prior to the revision. The deputy director of the Rural Economy Department of Development Research Center under China's State Council said that China had 250 million tons of state grain reserves plus an estimated 135 million tons or more in on-farm storage (*China Daily*, December 6, 2000). Several months later, *China Daily* (March 13, 2001) reported that China's total grain reserve was about 500 million tons. Each of these officially sanctioned reports of China's grain reserves is far above the 65.78-million-ton estimate reported by USDA prior to the revision. The United Nations Food and Agricultural Organization (FAO) made a critical review of China's historical supply and demand balances for cereals and concluded that China may have had 362 million tons of cereals at the end of crop year 2000/01 (FAO, *Food Outlook*, February 2001).

None of these estimates reported the composition of grain stocks (by type of grain), nor was a date given for the inventories, so analysts cannot determine

whether the figures are for the beginning, middle, or end of crop years. USDA used these aggregate figures as a benchmark and then estimated the composition of the stocks among individual commodities, including corn, wheat, and rice, using other sources of information and analysts' judgment.

### ***China Sets High Grain Reserve Targets***

China maintains a much larger grain inventory than other countries. FAO suggested that world grain reserves should be around 17-18 percent of world consumption (FAO, *Approaches to World Food Security*, Chapter 2, pp. 19-37, Rome, 1983). This reserve is the quantity that should be on hand when inventories are at their lowest level (before new crops are harvested) and is equivalent to 1.5 months of food consumption. If the reserve can be maintained at this level, the world will have a 95-percent chance of avoiding chaotic market prices during a crop failure. Using FAO's suggested grain reserve figure for China, and assuming that China's annual grain consumption is 450 million tons, then China should maintain a reserve target of 76-81 million tons.

China's officials argue that the reserve levels recommended by FAO are too low. They gave four reasons why China needs higher reserve levels:

- ◆ Mobility of grain is limited within China. China cannot move grains from specific surplus areas to deficit areas quickly enough to avert food shortages.
- ◆ FAO's figures did not consider the possibility of multiple-year crop disasters. Managing a single-year crop failure is much easier than managing consecutive crop failures. Historically, China has experienced multiple-year crop failures.

- ◆ Substitutability among various grain types is limited. Reserve levels should be set separately for each type of grain, since one grain cannot be perfectly substituted for another.
- ◆ Production technology and price elasticities could change from time to time as market conditions change. The reserve target should be flexible to accommodate these changes.

All indications are that China aims for grain reserves that are much higher than the FAO targets. The 1995 grain policy reform, known as the Governor's Grain Bag policy, mandated a minimum reserve of 3 months of grain consumption for grain-surplus provinces and 6 months for grain-deficit provinces. These reserve targets are much higher than FAO's recommendation of 1.5 months.

A recent publication on China's grain policy provides some guidance on how China sets inventory targets for different grains (table J-2). The grain stock is targeted to include 50 percent wheat, 30 percent rice, and 20 percent coarse grain. USDA used these targets as a basis for allocating total grain stock estimates among individual grains at the national level. USDA does not know how many individual provinces actually met their mandatory reserve targets. However, these reserve targets are the only source of information available to allocate grain stocks by type of grain.

### Key Components of Grain Storage

China has at least five major categories of grain reserves, each with a distinct function in Chinese society.

1. **Central government (state) reserves.** The reorganization of the State Administration of Grain Reserve in 2000 separated policy-formulating entities from

grain trade business operations. The government set up 14 grain companies in selected production and consumption areas, and all companies became operational in 2000. These grain companies now directly control and operate 2,800 grain warehouses with an estimated storage capacity of 25 million tons.

2. **Government grains in circulation.** These reserves include grain purchases based on protection (procurement) prices, which can be resold at market prices. Generally, two-thirds of the government procurement amount is circulated each year, including food supplies to military and government facilities. Grains in circulation could be five times higher than the 2-million ton government reserve.
3. **Local government reserves.** These reserves protect against region-specific grain shortages that may not be immediately alleviated due to the poor transportation infrastructure within China. China would like to see a separate local grain reserve (county, township, and village) as a buffer against short-term price fluctuations. The government set the target at 20 million tons, equivalent to 1- to 1.5-month consumption needs.
4. **Retail and wholesale grain stores.** Small private enterprises and retailers (including processors and food retailers) can purchase grain directly from farmers. Retail and wholesale grain stores exist in numerous places. These reserves are considered to be true "free market" grain in the commercial pipeline. Grain is fresh and consumers pay premium prices for quality. However, no government surveys were conducted for this segment of the total storage.
5. **On-farm storage.** Farmers can store their grain at home or at local mills when home storage space is limited. Statistical publications from China indicate that grain stocks kept by rural households range from 350 to 400 kilograms (770 to 880 pounds) per

**Table J-2—China's reserve target by specific grains**

Grains	Sown area % of total crops	Production % of total grain output	Stock level	
			(average 1996-98) % of total grains	Targeted share of total grain
<i>Percent</i>				
Rice	22-24	42-44	Indica, 40 Japonica, 10	30
Wheat	20-23	20-23	40	50
Coarse grain	14-16	18-20	10	20
Total	56-63	80-87	100	100

Source: Dai, Yuanchen et al., *Reforms of China's Grain Circulation System*, Guangdong Economic Publications, September 1999.

capita. Based on a sample of farm households, China's Grain Bureau estimated that on-farm storage was 90 million tons for 1995/96 (a 300-percent increase from the early 1980s).

Excluding on-farm and free market stocks, China's authorities consider that the combined total of central and provincial grain reserves should be no less than 75 million tons at the end of May every year. USDA took this specific point of time to begin the adjustment of annual ending stocks.

### ***Only a Fraction of On-farm Stocks Will Enter Commercial Channels***

Farm households hold most of China's grain inventories. According to some estimates, on-farm grain stocks exceeded 450 million tons in 1994 and 1995 (Crook). Farm households hold considerable grain stocks because they are largely self-sufficient in food and rural food markets are still relatively undeveloped in rural China. In other words, households must store enough grain to satisfy their family consumption needs and have a buffer against crop failures or natural disasters. The lack of insurance and the poorly developed market and transportation infrastructure in China make it difficult to move grain to address region-specific shortages. Finally, farmers use grain as a store of wealth since the poorly developed financial system provides little or no means for farmers to save for retirement or obtain credit when personal financial needs arise.

In 1995/96, China's Grain Bureau surveyed a small sample of 160 farm households to assess the amount of grain stored and farmers' motives for storage. The survey found that the largest number (nearly one-third) of households had stored grain equivalent to 6-12 months of consumption. About 20 percent of households had 6 months or less, and 16 percent had no grain stored. Another 18 percent had storage of 12-18 months, 9 percent had storage of 18-24 months, and 4 percent had enough grain for 2 years or more. The overall weighted average of households was 9 months of storage.

A much higher stock number can be derived from the National Bureau of Statistics annual rural household survey, which showed an average of 470 kg per capita of grain held on farms at the beginning of 1997. This amount was 1.87 times the per capita rural consumption of 251 kg reported for 1997, equivalent to 22 months of consumption. With China's 1997 rural

population at 846 million, this per capita amount would translate to total on-farm stocks of 407 million tons in 1997. This number is within the range of on-farm stock estimates for 1991-94 made by Crook.

USDA analysts determined that only a fraction of on-farm grain inventories should be included in estimates of commercial grain stocks. A 1995/96 Grain Bureau survey of China's on-farm storage indicated that most rural households stored grain for household use only or as a form of long-term savings. A relatively small minority held grain for reasons related to speculation (16.6 percent) or price stability (10.4 percent). China's Grain Bureau analysts estimated that 20 percent of on-farm stocks could potentially reach the commercial market if prices rose. Using these results for guidance, USDA included a 20-percent share of on-farm stocks in its total grain stock estimate.

### ***Estimates Based on Sparse Information***

The true quantity of China's grain stocks remains unknown except to select officials within the Chinese government. The USDA numbers are rough estimates based on sparse data. Even if the true numbers were revealed, there would still be disagreement about which components of China's grain stocks should be included when assessing commercial grain supplies. Much of the on-farm stock and perhaps a large portion of government reserves will not enter commercial channels. USDA believes that the new estimates are a better reflection of market conditions, but additional adjustments may be made as new information becomes available.

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**Appendix table 1—China's grain area, yield, and production, 1991-2000 <sup>1</sup>**

Items	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>Million hectares</i>										
Sown area:										
Wheat	30.1	30.5	30.2	29.0	28.8	29.6	30.1	29.8	28.9	na
Rice	32.6	32.1	30.4	30.2	30.7	31.4	31.8	31.2	31.3	na
Corn	21.6	21.0	20.7	21.2	22.8	24.5	23.8	25.2	25.9	na
Sorghum	1.4	1.3	1.3	1.4	1.2	1.3	1.1	1.0	0.0	na
Millet	2.1	1.9	1.8	1.7	1.5	1.5	1.4	1.4	0.0	na
Tubers	9.1	9.1	9.2	9.3	9.5	9.8	9.8	10.0	10.4	na
Others <sup>2</sup>	15.5	14.7	16.8	16.9	15.3	14.3	14.9	15.2	16.8	na
Total <sup>3</sup>	112.3	110.6	110.5	109.5	109.9	112.4	112.9	113.8	113.2	108.5
<i>Tons per hectare</i>										
Yield: <sup>4</sup>										
Wheat	3.2	3.3	3.5	3.4	3.5	3.7	4.1	3.7	3.9	na
Rice	5.6	5.8	5.9	5.8	6.0	6.2	6.3	6.4	6.3	na
Corn	4.6	4.5	5.0	4.7	4.9	5.2	4.4	5.3	4.9	na
Sorghum	3.5	3.6	4.1	4.6	3.9	4.4	3.3	4.1	3.5	na
Millet	1.6	2.1	2.2	2.2	2.0	2.3	1.6	2.2	1.6	na
Tubers	3.0	3.1	3.5	3.3	3.4	3.1	3.3	3.6	3.5	na
<i>Million tons</i>										
Production:										
Wheat	96.0	101.6	106.4	99.3	102.0	110.3	123.3	109.7	113.9	99.6
Rice	183.8	186.2	177.7	175.9	185.2	195.1	200.7	198.7	198.5	187.9
Corn	98.8	95.4	102.7	99.3	112.0	127.5	104.3	133.0	128.1	106.0
Sorghum	4.9	4.7	5.5	6.3	4.8	5.7	3.6	4.1	3.2	na
Millet	3.4	3.9	4.0	3.7	3.0	3.3	2.3	3.1	2.3	na
Tubers <sup>5</sup>	27.2	28.4	31.8	30.3	32.1	30.0	31.9	36.0	36.4	36.9
Others <sup>2</sup>	21.3	22.4	28.3	30.3	27.5	32.6	28.1	27.7	26.0	na
Total <sup>3</sup>	435.3	442.7	456.4	445.1	466.6	504.5	494.2	512.3	508.4	462.2

Note: na = not available.

<sup>1</sup> Data are official figures released by the National Bureau of Statistics or the Ministry of Agriculture, except for 1996 individual coarse grains, potatoes, and other grains.

<sup>2</sup> Consists of soybeans, pulses, and other miscellaneous grains. All of these items are included in China's definition of total grains.

<sup>3</sup> Using China's definition of total grains.

<sup>4</sup> Calculated from area and production figures.

<sup>5</sup> Converted to a grain-equivalent weight using a 5:1 conversion ratio.

Sources: *China Agriculture Yearbook*, *China Statistical Yearbook*, and *China Statistical Abstract*.

**Appendix table 2—China's 1999 provincial grain, cotton, oilseed, sugar, and meat production**

Province	Grain <sup>1</sup>	Oilseeds <sup>2</sup>	Total meat	Pork	Cotton	Sugar <sup>3</sup>
<i>1,000 tons</i>						
Northeast:						
Heilongjiang	30,746	393	1,509	890	--	2,036
Liaoning	16,488	198	2,247	1,217	5	264
Jilin	23,056	314	2,364	1,217	--	258
North:						
Shandong	42,690	3,205	5,245	2,725	339	11
Hebei	27,463	1,295	3,939	2,265	223	75
Beijing	2,010	28	493	286	2	--
Tianjin	1,749	23	235	146	6	--
Henan	42,533	3,493	4,851	3,140	707	211
Shanxi	8,217	255	623	438	44	205
Northwest:						
Shaanxi	10,816	319	858	642	20	18
Gansu	8,149	438	577	391	43	738
Inner Mongolia	14,285	1,009	1,406	805	2	1,368
Ningxia	2,933	104	171	88	--	118
Xinjiang	7,993	605	804	151	1,354	3,542
Qinghai	1,036	285	201	70	--	1
East:						
Zhejiang	13,930	541	1,075	826	40	711
Jiangsu	35,590	1,840	3,069	1,962	246	229
Shanghai	2,081	134	541	259	2	80
Anhui	27,712	2,681	2,986	1,925	195	293
Central:						
Hubei	24,519	2,283	2,658	2,098	282	1,142
Hunan	27,254	1,302	4,261	3,649	177	1,685
Jiangxi	17,327	944	1,983	1,602	63	1,720
South:						
Guangdong	19,671	745	3,159	2,044	--	13,671
Guangxi	15,750	547	2,629	2,025	1	32,206
Fujian	9,422	258	1,388	1,100	--	1,388
Hainan	2,170	96	338	214	--	3,845
Southwest:						
Chongqing	11,116	241	1,405	1,206	1	76
Sichuan	35,514	1,516	5,234	4,052	76	1,613
Guizhou	11,252	673	1,171	995	1	569
Yunnan	13,993	206	1,921	1,622	1	15,269
Tibet	922	41	147	7	--	--
<b>Total</b>	<b>508,387</b>	<b>26,012</b>	<b>59,488</b>	<b>40,057</b>	<b>3,830</b>	<b>83,342</b>

Note: -- = no available data.

<sup>1</sup> China's definition includes soybeans, pulses, and other miscellaneous grains.

<sup>2</sup> China's definition excludes soybeans.

<sup>3</sup> Raw basis.

Source: *China Statistical Abstract*, 2000, pp. 103-4.

**Appendix table 3—China's oilseed and cotton area, yield, and production, 1990-2000**

Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>1,000 hectares</i>											
Sown area:											
Cotton	5,588	6,538	6,835	4,985	5,530	5,422	4,722	4,491	4,459	3,726	4,041
Soybeans	7,560	7,050	7,221	9,700	10,000	8,127	7,471	8,346	8,500	7,962	na
Oilseeds <sup>1</sup>	10,900	11,530	11,489	11,142	12,081	13,101	12,555	12,381	12,919	13,906	15,400
Peanuts	2,907	2,880	2,976	3,379	3,776	3,809	3,616	3,722	4,039	4,268	na
Rapeseed	5,503	6,133	5,976	5,300	5,783	6,907	6,734	6,475	6,527	6,899	na
Sesame seed	669	680	746	753	690	642	594	616	630	697	na
Sunflower seed	713	750	807	723	805	813	690	716	890	1,131	na
Other oilseeds <sup>2</sup>	1,108	1,087	984	987	1,033	930	921	852	834	911	na
<i>Kilograms per hectare</i>											
Yield:											
Cotton	807	869	660	750	780	879	890	1,025	830	1,028	1,093
Cottonseed	1,372	1,478	1,121	1,278	1,393	1,582	1,601	1,844	1,817	1,850	1,968
Soybeans	1,455	1,377	1,426	1,578	1,600	1,661	1,770	1,765	1,783	1,795	na
Oilseeds <sup>1</sup>	1,480	1,421	1,428	1,619	1,647	1,717	1,761	1,743	1,791	1,871	na
Peanuts	2,191	2,189	2,000	2,492	2,564	2,687	2,804	2,592	2,943	2,961	na
Rapeseed	1,264	1,212	1,281	1,309	1,296	1,416	1,366	1,479	1,272	1,469	na
Sesame seed	701	640	692	747	794	908	968	919	1,042	1,066	na
Sunflower seed	1,879	1,467	1,820	1,770	1,880	1,561	1,917	1,642	1,647	1,561	na
Other oilseeds <sup>2</sup>	901	729	831	845	660	684	944	711	997	805	na
<i>1,000 tons</i>											
Production:											
Cotton (1,000 tons) <sup>3</sup>	4,508	5,675	4,508	3,739	4,333	4,768	4,203	4,603	4,501	3,829	4,417
Cotton (1,000 bales) <sup>3</sup>	20,705	26,065	20,705	17,175	19,901	21,899	19,304	21,142	20,673	17,587	20,287
Cottonseed	7,665	9,660	7,664	6,370	7,704	8,580	7,560	8,280	8,100	6,894	7,953
Soybeans	11,000	9,710	10,300	15,310	16,000	13,502	13,220	14,732	15,152	14,292	na
Oilseeds <sup>1</sup>	16,132	16,383	16,412	18,039	19,896	22,500	22,106	21,574	23,139	26,012	29,548
Peanuts	6,368	6,300	5,953	8,421	9,682	10,235	10,138	9,648	11,886	12,639	14,437
Rapeseed	6,958	7,436	7,653	6,939	7,492	9,777	9,201	9,578	8,301	10,132	11,381
Sesame seed	469	435	516	563	548	583	575	566	656	743	811
Sunflower seed	1,339	1,420	1,472	1,282	1,500	1,269	1,323	1,176	1,465	1,765	na
Other oilseeds <sup>2</sup>	998	792	818	834	682	636	869	606	831	733	na
Edible vegetable oil <sup>4</sup>	4,454	4,868	4,813	5,307	6,145	6,800	6,653	7,073	8,281	9,693	na
Available meal	11,915	12,553	12,825	15,057	17,159	17,664	16,987	18,184	22,168	25,806	na

Note: na = not available.

<sup>1</sup> Using China's definition of oilseeds, which exclude soybeans and cottonseed.

<sup>2</sup> Calculated as a residual. Includes mainly huma (an edible oil-bearing flaxseed) and castor beans, but excludes oil-bearing tree seeds.

<sup>3</sup> Cotton production is on a ginned-weight basis. One bale weighs 480 pounds.

<sup>4</sup> Includes soy, cottonseed, peanut, rapeseed, and sunflower seed oils.

Sources: *China Statistical Yearbook*, except Economic Research Service, U.S. Department of Agriculture *World Agricultural Supply and Demand Estimates* for edible vegetable oil and available meal.

**Appendix table 4—China's year-end livestock inventory and product output, 1990-2000**

Item	Old data series						Revised data series <sup>1</sup>				
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>Million head</i>											
Year-end inventory:											
Hogs	362.4	369.7	384.2	393.0	414.6	441.7	362.8	400.3	422.6	430.2	446.8
Sheep	112.8	110.9	109.7	111.6	117.5	127.3	114.1	121.0	127.4	131.1	133.2
Goats	97.2	95.4	97.6	105.7	123.1	149.6	123.2	134.8	141.7	148.2	157.2
Large animals:	130.2	131.9	134.7	139.9	149.2	158.6	133.6	145.4	148.0	150.3	151.5
Cattle	102.9	104.6	107.8	113.2	123.3	132.1	110.3	121.8	124.4	127.0	128.7
Dairy cows	2.7	3.0	3.1	3.4	3.8	4.2	3.3	na	na	na	na
Water buffalo	21.7	22.0	22.2	22.6	22.9	23.6	21.7	22.5	22.7	na	na
Horses	10.2	10.1	10.0	10.0	10.0	10.1	8.7	8.9	9.0	8.9	8.8
Mules	5.5	5.6	5.6	5.5	5.6	5.4	4.8	4.8	4.7	4.7	4.5
Donkeys	11.2	11.2	11.0	10.9	10.9	10.8	9.4	9.5	9.6	9.3	9.2
Camels	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3
Draft animals	76.1	76.8	77.6	80.6	84.6	88.1	73.8	77.2	na	na	na
Poultry <sup>2,3</sup>	2,489.9	na	na	na	na	na	2,751.8	na	na	na	na
Slaughter:											
Hogs	309.9	329.0	351.7	378.2	421.0	480.5	412.3	464.8	502.2	519.8	526.7
Cattle	10.9	13.0	15.2	19.0	25.1	30.5	26.9	32.8	35.9	37.7	39.6
Sheep & goats	89.3	98.2	102.7	111.5	131.3	165.4	134.1	159.5	172.8	188.2	na
Poultry <sup>2</sup>	na	2,823.6	3,192.5	3,977.6	na	na	7,189.1	6,388.5	6,843.8	7,431.7	na
<i>Percent of previous year's inventory</i>											
Slaughter rate:											
Hogs	87.8	90.8	95.1	98.4	107.1	115.9	--	128.1	125.4	123.0	122.4
Cattle	10.8	12.7	14.5	17.6	22.2	24.7	--	29.8	29.5	30.3	31.2
Sheep & goats	42.2	46.7	49.8	53.8	60.4	68.7	--	67.2	67.6	70.0	na
Poultry <sup>2,3</sup>	105.4	113.4	na	na	na	na	--	232.2	na	na	na
<i>1,000 tons</i>											
Animal products:											
Red meat	25,135	27,238	29,406	32,255	36,927	42,653	36,947	42,500	45,982	46,474	48,382
Pork	22,811	24,523	26,353	28,544	32,048	36,484	31,580	35,963	38,837	38,907	40,314
Beef	1,256	1,535	1,803	2,337	3,270	4,154	3,557	4,409	4,799	5,054	5,328
Mutton	1,068	1,180	1,250	1,374	1,607	2,015	1,810	2,128	2,346	2,513	2,740
Poultry & other meat	3,229	3,950	4,542	5,736	7,552	9,347	9,007	10,188	11,256	13,016	na
Eggs	7,946	9,220	10,199	11,796	14,790	16,767	19,652	18,971	20,213	21,347	22,433
Cow milk	4,157	4,644	5,031	4,987	5,288	5,764	6,294	6,011	6,629	7,176	8,274
Sheep & goat milk	594	599	608	647	801	964	1,064	800	825	893	917
Sheep wool	239	240	238	240	255	277	298	255	278	283	293
Mohair	17	17	17	19	25	30	35	26	31	32	33
Cashmere	6	6	6	7	7	9	10	9	10	10	11

Note: na = not available. -- = not applicable (ration to previous year's inventory is meaningless, due to data revision).

<sup>1</sup> All data series were revised, based on China's 1997 Agricultural Census.

<sup>2</sup> Includes chickens, ducks, and geese.

<sup>3</sup> Data for 1990 and 1991 are estimates.

Sources: *China Statistical Yearbook*, *China Agricultural Yearbook*, and *China Statistical Abstract*.

**Appendix table 5—China's major agricultural exports, by value, 1992-2000**

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000
	<i>Million dollars</i>								
Live animals	479	453	467	503	487	476	441	385	385
Swine	290	272	269	278	294	302	291	237	232
Poultry	94	90	105	125	121	114	96	99	104
Meat	372	347	634	1,021	1,086	963	839	692	754
Pork	76	63	128	245	215	195	180	67	69
Poultry	166	185	380	621	691	608	523	539	587
Fish and seafood	1,366	1,254	1,815	2,087	1,738	1,886	1,732	1,949	2,271
Dairy, eggs, and honey	159	143	156	162	195	165	175	164	188
Other animal products	415	365	546	711	678	699	648	622	757
Live trees and plants	15	19	24	28	30	32	29	31	32
Vegetables	1,053	1,134	1,587	1,713	1,542	1,510	1,474	1,521	1,545
Edible fruit and nuts	283	345	414	480	461	464	433	426	417
Citrus	32	41	58	60	67	76	48	42	47
Apples	20	48	41	45	69	77	65	76	97
Spices, coffee, and tea	463	465	454	465	492	547	520	491	506
Tea	362	356	294	275	283	332	370	339	347
Cereals	1,485	1,473	1,532	76	187	1,174	1,497	1,135	1,639
Corn	1,187	1,154	944	13	30	856	532	450	1,047
Rice	218	253	515	16	112	265	927	652	561
Milling products	47	64	80	101	218	186	106	80	93
Wheat flour	25	38	27	55	158	125	74	46	45
Oilseeds and miscellaneous grains	854	792	1,280	1,170	1,056	868	752	806	877
Soybeans	160	102	222	100	66	73	63	62	64
Peanuts	190	196	315	257	254	137	156	195	232
Lac, vegetable sap, and extract	28	34	34	45	50	61	54	45	47
Other vegetables	51	45	54	61	52	50	45	40	43
Fats and oils	140	206	501	459	382	681	324	141	129
Prepared meat, fish	398	602	780	1,116	1,470	1,384	1,212	1,386	1,882
Sugar	671	654	363	234	305	194	183	140	173
Cocoa	36	45	35	41	49	56	44	40	29
Baking products, prepared	128	122	166	211	235	270	262	291	360
Preserved food	688	683	816	1,083	1,047	1,043	1,022	1,127	1,315
Miscellaneous food	111	122	160	216	251	303	327	337	359
Beverages	329	299	378	391	397	465	450	457	494
Beer	31	42	41	53	32	34	26	30	40
Food waste, animal feed	492	444	453	336	347	276	189	215	253
Tobacco	441	640	686	999	976	656	577	336	302
Fertilizers	30	48	68	130	207	212	156	230	323
Rubber	313	373	465	746	832	955	1,006	1,177	1,561
Hides and skins	156	149	337	395	295	355	366	361	544
Silk yarn and fabric	944	788	1,253	1,173	894	945	751	755	928
Animal hair yarn and fabric	713	608	902	773	819	993	759	965	1,202
Cotton yarn and fabric	2,566	2,784	3,235	3,850	3,158	3,116	2,810	3,292	3,730
Cotton, raw	211	191	149	47	12	3	56	283	305
<b>Total</b>	<b>15,226</b>	<b>15,500</b>	<b>19,675</b>	<b>20,776</b>	<b>19,936</b>	<b>20,985</b>	<b>19,183</b>	<b>19,637</b>	<b>23,138</b>

Source: China Customs statistics.

**Appendix table 6—China's major agricultural imports, by value, 1992-2000**

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000
	<i>Million dollars</i>								
Live animals	20	19	23	37	47	41	54	66	52
Meat	57	68	85	95	157	148	143	499	637
Pork	0	0	0	1	1	2	8	24	58
Poultry	50	58	72	80	140	129	108	410	481
Fish and seafood	323	364	574	599	597	543	667	882	1,212
Dairy, eggs, and honey	69	57	85	64	57	67	89	164	218
Other animal products	41	41	49	72	95	114	98	112	158
Live trees and plants	6	10	6	6	5	8	11	17	21
Vegetables	38	25	15	78	77	74	71	83	82
Edible fruit and nuts	41	45	66	84	197	235	242	258	368
Bananas	5	8	19	42	141	146	163	140	169
Grapes	2	2	2	3	4	5	4	24	35
Spices, coffee, and tea	24	14	10	15	28	10	20	19	23
Coffee	6	3	1	6	17	3	11	8	6
Cereals	1,677	997	1,281	3,582	2,555	889	696	497	574
Wheat	1,504	834	961	2,026	1,890	368	279	86	147
Barley	134	128	179	241	304	382	241	294	313
Rice	39	35	141	434	286	138	120	78	113
Milling products	38	29	37	72	71	68	55	79	64
Wheat flour	26	7	8	10	14	16	15	17	15
Oilseeds and miscellaneous grains	116	103	133	187	412	989	1,344	1,639	3,072
Soybeans	29	26	14	75	320	843	804	890	2,270
Rapeseeds	0	0	39	26	0	16	402	628	658
Lac, vegetable sap, extract	16	24	24	27	21	21	19	29	34
Other vegetables	31	31	40	90	40	33	43	48	83
Fats and oils	540	516	1,827	2,623	1,695	1,653	1,487	1,359	1,023
Palm oil	232	318	690	865	527	603	592	597	456
Soybean oil	100	38	651	1,024	764	666	521	421	126
Rapeseed oil	89	73	319	413	187	197	175	38	28
Prepared meat, fish	7	5	8	12	8	8	6	12	12
Sugar	273	133	446	935	428	254	177	182	182
Cocoa	36	39	49	59	59	71	64	53	71
Baking products, prepared	16	24	32	23	17	16	15	48	71
Preserved food	14	26	18	15	16	18	24	43	60
Miscellaneous food	47	61	68	66	85	87	83	118	147
Beverages	35	46	37	37	42	68	75	123	161
Beer	1	6	6	4	18	14	21	63	93
Food waste, animal feed	461	307	347	420	1,298	1,785	1,402	619	907
Tobacco	204	200	32	259	457	254	106	88	204
Fertilizers	3,004	1,479	1,938	3,742	3,563	2,995	2,518	2,248	1,730
Rubber	555	598	776	985	1,432	1,245	1,115	1,469	1,906
Hides and skins	1,188	1,580	1,986	2,251	2,359	2,496	2,254	2,330	2,954
Silk yarn and fabric	174	181	195	176	157	176	139	124	138
Animal hair yarn and fabric	1,282	1,191	1,403	1,656	1,536	1,545	1,177	1,265	1,831
Cotton yarn and fabric	1,719	1,237	2,526	3,360	3,530	3,732	2,584	2,357	2,789
Cotton, raw	430	16	880	1,378	1,196	1,330	332	67	74
<b>Total</b>	<b>12,482</b>	<b>9,466</b>	<b>14,996</b>	<b>23,005</b>	<b>22,237</b>	<b>20,973</b>	<b>17,110</b>	<b>16,897</b>	<b>20,858</b>

Source: China Customs statistics.

**Appendix table 7—U.S. exports of agricultural, fish, and forestry products to China, 1993-2000**

Product	1993	1994	1995	1996	1997	1998	1999	2000
	<i>1,000 dollars</i>							
Bulk agricultural total	297,430	826,211	2,026,726	1,588,091	1,047,396	500,375	441,741	1,105,858
Wheat	274,186	166,228	499,791	426,381	43,647	45,971	32,877	17,826
Coarse grains	0	3,510	638,278	13,842	31	44,143	15,441	10,050
Rice	15	136	63	471	202	289	406	344
Soybeans	22,999	8,645	50,657	414,476	410,554	273,508	358,735	1,007,653
Cotton	179	646,935	836,657	730,456	582,670	122,763	23,356	58,871
Tobacco	0	0	767	250	2,342	6,437	4,508	849
Pulses	28	92	123	31	43	131	194	227
Peanuts	0	60	6	0	3	14	0	181
Other bulk commodities	22	603	383	2,184	7,904	7,119	6,224	9,857
Intermediate agricultural total	39,787	208,933	539,756	384,658	432,132	708,150	262,980	402,184
Wheat flour	0	0	14	110	10	0	32	238
Soybean meal	29	0	76	116,700	84,429	159,541	304	20
Soybean oil	270	104,192	341,264	104,467	161,895	319,506	44,404	430
Vegetable oils (excluding soybean oil)	93	27,087	14,125	5,715	3,100	2,558	4,870	7,260
Feeds and fodders (excluding pet foods)	978	2,790	8,142	8,441	10,080	13,496	6,920	13,946
Live animals	7,976	9,014	9,364	6,402	6,858	4,686	5,251	6,696
Hides and skins	13,077	46,272	100,145	106,640	111,905	124,800	96,535	228,751
Animal fats	3	2,397	39,178	2,686	3,103	3,831	14,724	12,898
Planting seeds	1,370	969	10,671	2,837	8,174	10,236	12,802	26,862
Sugars, sweeteners, and beverage bases	2,386	792	931	1,142	1,394	1,142	951	2,925
Other intermediate products	13,604	15,420	15,846	29,518	41,184	68,354	76,187	102,158
Consumer-oriented								
agricultural total	36,678	48,643	67,156	106,214	125,250	131,521	149,807	216,117
Snack foods (excluding nuts)	2,956	6,871	7,432	6,986	11,991	8,549	14,020	20,781
Breakfast cereals and pancake mix	7	45	289	1,554	1,598	508	323	661
Red meats, fresh/chilled/frozen	1,828	3,922	4,674	5,488	11,257	15,278	15,192	22,215
Red meats, prepared/preserved	126	101	239	616	1,047	2,918	1,125	863
Poultry meat	17,569	23,584	33,892	60,345	52,413	38,474	49,477	45,363
Dairy products	565	1,716	5,111	4,560	11,296	13,908	17,744	21,453
Eggs and products	158	22	61	76	195	139	343	1,023
Fresh fruit	238	636	2,169	683	887	11,333	1,866	23,144
Fresh vegetables	13	365	297	1,428	2,728	3,751	3,657	5,172
Processed fruit and vegetables	919	1,386	1,695	4,686	6,780	9,321	15,833	25,811
Fruit and vegetable juices	512	246	826	514	711	1,490	1,734	1,210
Tree nuts	7,272	4,065	250	2,190	2,367	2,337	3,702	9,090
Wine and beer	560	478	2,998	1,958	3,158	2,404	3,826	1,420
Nursery products and cut flowers	45	130	90	175	1,804	1,029	1,358	1,119
Pet foods (dog and cat food)	8	93	124	183	133	490	977	1,454
Other consumer-oriented products	3,900	4,983	7,009	14,772	16,885	19,592	18,630	35,338

--continued

**Appendix table 7—U.S. exports of agricultural, fish, and forestry products to China, 1993-2000--Continued**

Product	1993	1994	1995	1996	1997	1998	1999	2000
	<i>1,000 dollars</i>							
Forest products								
(excluding pulp and paper)	106,277	64,065	28,006	32,010	49,850	41,356	57,020	93,991
Logs and chips	97,605	56,157	13,915	11,041	13,890	11,336	7,870	19,280
Hardwood lumber	1,574	1,855	5,851	9,136	16,901	13,960	29,904	53,960
Softwood and treated lumber	398	456	358	627	1,737	1,318	1,213	2,332
Panel products (including plywood)	1,304	1,991	4,662	3,891	4,863	6,264	9,888	12,967
Other value-added wood products	5,395	3,606	3,220	7,316	12,459	8,478	8,145	5,452
Fish and seafood products, edible	27,629	43,010	71,632	78,587	111,486	69,284	86,498	137,917
Salmon, whole or eviscerated	837	1,941	4,297	3,182	2,513	9,735	8,234	16,300
Salmon, canned	0	0	0	0	0	0	102	684
Crab and crabmeat	20,030	18,973	4,823	5,979	3,187	4,996	20,230	11,208
Surime (fish paste)	610	324	1,110	1,061	7,165	2,738	431	3,223
Roe and urchin (fish eggs)	397	166	609	3,344	2,326	4,954	4,164	4,781
Other edible fish and seafood	5,754	21,607	60,794	65,021	96,294	46,860	53,337	101,721
Agricultural product total	373,894	1,083,786	2,633,638	2,078,963	1,604,778	1,340,046	854,528	1,724,159
Agricultural, fish and forestry total	507,800	1,190,861	2,733,276	2,189,560	1,766,114	1,450,686	998,046	1,956,067

Source: U.S. Bureau of the Census.

**Appendix table 8—U.S. imports of agricultural, fish and forestry products from China, 1993-2000**

Product	1993	1994	1995	1996	1997	1998	1999	2000
	<i>1,000 dollars</i>							
Bulk agricultural total	74,783	52,551	50,100	49,419	51,561	56,592	82,574	55,453
Coarse grains	43	55	96	69	39	50	27	12
Rice	33	2,290	422	403	552	283	9,344	642
Tobacco	37,978	7,238	2,461	6,494	9,192	11,381	10,661	17,635
Rubber and allied products	81	1,779	10,400	401	556	473	723	1,784
Raw coffee	16	56	747	6	802	197	418	365
Cocoa beans	0	278	192	0	0	0	0	254
Tea (including herb tea)	27,702	29,533	24,917	31,260	28,156	33,121	26,492	22,387
Raw beef and cane sugar	81	183	348	96	153	421	278	22
Other bulk commodities	8,847	11,139	10,516	10,689	12,112	10,666	34,631	12,352
Intermediate agricultural total	160,217	176,631	205,473	242,640	307,754	349,302	315,364	374,508
Tropical oils	0	0	0	0	115	11	0	45
Other vegetable oils	1,816	2,155	1,454	5,207	6,448	7,724	5,155	6,481
Feeds and fodders (excluding pet foods)	1,324	2,502	4,285	4,686	11,734	8,009	8,375	17,744
Live animals	34	2	13	31	2	0	45	81
Hides and skins	223	276	115	122	79	172	153	95
Planting seeds	11,742	14,899	16,916	23,027	27,103	25,750	23,155	24,369
Sugars, sweeteners, and beverage bases	643	955	1,600	2,404	3,493	5,638	3,301	703
Essential oils	20,413	25,187	29,235	21,607	17,217	25,123	26,084	24,362
Cocoa paste and cocoa butter	30,024	23,676	24,311	36,104	49,364	33,055	21,034	16,998
Other intermediate products	93,998	106,980	127,544	149,452	192,199	243,820	228,062	283,630
Consumer-oriented agricultural total	216,111	213,223	237,301	303,853	322,624	335,174	367,478	382,731
Snack foods (including chocolate)	6,183	8,723	8,420	10,480	15,064	16,671	24,702	35,837
Red meats, fresh/chilled/frozen	1,389	544	1,183	1,135	1,590	1,319	2,350	3,686
Red meats, prepared/preserved	50	12	51	20	101	159	252	0
Other dairy products	300	192	287	245	81	375	411	1,699
Other fresh fruit	30	111	68	69	201	840	2,493	3,953
Fresh vegetables	17,877	11,724	8,521	11,180	14,025	18,840	15,421	9,783
Processed fruit and vegetables	96,060	104,607	133,583	161,732	160,117	155,728	154,554	150,316
Fruit and vegetable juices	1,279	1,232	3,067	8,285	26,128	30,083	24,412	39,511
Tree nuts	21,209	14,446	10,910	19,073	19,324	22,876	29,686	18,217
Wine and beer	7,261	4,944	6,918	5,545	6,514	6,388	6,639	6,141
Nursery products and cut flowers	848	1,067	3,529	6,477	4,517	3,556	5,062	6,850
Roasted and instant coffee	191	1,160	555	9	516	227	406	497
Spices	10,911	15,800	13,569	11,701	14,325	17,637	21,965	26,904
Other consumer-oriented products	52,522	48,661	46,640	67,902	60,121	60,475	79,125	79,337

*--continued*

**Appendix table 8—U.S. imports of agricultural, fish and forestry products from China, 1993-2000--Continued**

Product	1993	1994	1995	1996	1997	1998	1999	2000
	<i>1,000 dollars</i>							
Forest products								
(excluding pulp and paper)	150,881	194,547	226,366	258,250	340,066	459,584	596,740	751,115
Logs and chips	45	12	36	71	0	0	60	92
Hardwood lumber	79	61	739	1,040	1,129	926	2,347	2,661
Softwood and treated lumber	0	17	113	2	118	211	124	278
Panel products (including plywood)	8,018	7,748	7,857	5,933	14,359	21,843	29,673	35,042
Other value-added wood products	142,739	186,708	217,622	251,204	324,460	436,604	564,535	713,042
Fish and seafood products, edible	298,799	259,026	305,763	285,303	320,904	322,827	430,754	578,594
Shrimp	183,983	105,381	79,578	35,772	67,801	36,041	49,938	136,737
Tuna	136	467	499	55	44	969	909	464
Lobster	815	2,620	15,710	6,971	0	567	328	910
Groundfish, fillet/steak	45,317	43,860	70,172	92,080	85,663	118,176	138,764	154,344
Salmon, whole or eviscerated	0	54	0	1	21	481	680	0
Other edible fish and seafood	68,548	106,644	139,804	150,424	166,467	166,594	240,136	286,139
Agricultural product total	451,111	442,406	492,874	595,912	681,939	741,068	765,416	812,692
Agricultural, fish and forestry total	900,791	895,978	1,025,003	1,139,465	1,342,909	1,523,479	1,792,910	2,142,401

Source: U.S. Bureau of the Census.

**Appendix table 9—China's other agricultural output, 1990-2000**

Items	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	<i>1,000 tons</i>										
Sugar crops	72,145	84,187	88,080	76,240	73,452	79,404	82,291	93,865	97,904	83,342	74,350
Sugarcane	57,620	67,898	73,011	64,194	60,927	65,420	66,876	78,897	83,438	74,703	66,280
Sugarbeets	14,525	16,289	15,069	12,048	12,525	13,984	15,415	14,968	14,466	8,639	8,070
Tobacco	2,627	3,031	3,499	3,451	2,238	2,314	3,234	4,251	2,364	2,469	2,552
Flue-cured	2,259	2,670	3,119	3,036	1,940	2,072	2,946	3,908	2,088	2,185	2,238
Fruit	18,744	21,761	24,400	30,112	34,992	42,114	46,528	50,893	54,529	62,376	62,251
Tea	540	542	560	600	588	588	593	613	665	676	683
Jute and hemp <sup>1</sup>	726	513	619	672	354	371	365	430	248	164	na
Rubber	264	296	309	326	374	424	402	452	462	490	480
Silk cocoons	534	584	660	756	844	760	508	469	526	485	na
Aquatic products	12,370	13,508	15,571	18,230	21,432	25,172	32,881	36,018	39,065	41,224	42,785

Note: na=not available.

<sup>1</sup> Hemp data are on a processed basis (2 kg raw equals 1 kg processed).

Source: *China Statistical Yearbook*.

**Appendix table 10—China's macroeconomic indicators, 1990-2000**

Indicator	Units	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000 <sup>2</sup>
GDP	US\$ bil.	387.79	406.12	483.01	601.08	542.52	700.25	816.51	898.22	946.31	989.62	1,079.71
GDP growth	Percent	3.80	9.20	14.20	13.50	12.60	10.50	9.60	8.80	7.80	7.10	8.00
Change in CPI	Percent	3.10	3.40	6.40	14.70	24.10	17.10	8.30	2.80	-0.80	-1.40	0.40
Government finance: <sup>1</sup>												
Revenue	US\$ bil.	61.41	59.17	63.16	75.48	60.54	74.75	89.10	104.36	119.29	138.26	161.59
Expenditure	US\$ bil.	64.47	63.62	67.85	80.57	67.21	81.71	95.47	111.38	130.43	159.33	191.79
Budget (deficit)	US\$ bil.	-3.06	-4.46	-4.69	-5.09	-6.67	-6.96	-6.37	-7.03	-11.14	-21.07	-30.19
Foreign trade:												
Exports	US\$ bil.	62.09	71.84	84.94	91.74	121.01	148.78	151.05	182.79	183.81	194.93	249.20
Imports	US\$ bil.	53.35	63.79	80.59	103.96	115.61	132.08	138.83	142.37	140.24	165.70	225.10
Balance of trade	US\$ bil.	8.74	8.05	4.35	-12.22	5.40	16.70	12.22	40.42	43.57	29.23	24.10
Exchange rate	RMB/\$US	4.78	5.32	5.52	5.76	8.62	8.35	8.31	8.29	8.28	8.28	8.28
Population (year-end):	Million	1,143	1,158	1,172	1,185	1,199	1,211	1,224	1,236	1,248	1,259	1,266
Urban	Million	302	305	324	333	343	352	360	370	379	389	458
Rural	Million	841	853	848	852	856	859	864	866	869	870	807

Note: GDP=Gross domestic product. CPI=Consumer price index.

<sup>1</sup> Central government only.

<sup>2</sup> Preliminary numbers from China Statistical Abstract 2001.

Sources: *China Statistical Yearbook* and *IMF International Financial Statistics*.